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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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19 MAY 1987

EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

WEST EUROPE

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BRIEFS

ANTIAIR DEFENSE AT KOUROU--France is going to install new antiair defense equipment on the Kourou base in Guyana, a base which is used to launch the European rocket Ariane. This equipment includes a battery of Crotale ground-to-air missiles and a Centaure low-altitude radar detection device to parry possible air attacks against the infrastructures of the French space base. The decision comes at a time when Guyana's military command has been revamped and strengthened as a result of the repercussions in the department of the civil war in neighboring Suriname. The Kourou base is quite near the border and should serve as a launch point not only for European civil satellites but also for French military transmission and observation satellites during the next decade. The Crotale missiles and Centaure radar that the French air force has been given the task of installing in Kourou are the same models as those France recently set up in Chad in the N'Djamena and Abeche region. Moreover, the French air force flew a group of combat planes composed of Jaguar attack planes and Mirage F-1 CR reconnaissance planes to Guyana for demonstration purposes. These planes, on their way back from an exercise in the United States, made a brief stopover in Guyana with their supply plane to demonstrate their capability of intervening, should the government so decide, from as far away as France in case of need. [Text] [Paris LE MONDE in French 7 Mar 87 p 28] 9825

CSO: 3698/339

BIOREACTORS, PROTEIN RESEARCH DEVELOPED IN SWEDEN

New Generation Bioreactor

Stockholm TEKNIK I TIDEN in Swedish No 1, 1987 p 14

[Article: "They Are Breaking Isolation"]

[Text] GeDevelop is developing glass fiber matrices with custom-made properties for various applications in biotechnology. This means a new generation of bioreactors for cell cultivation and matrices for separating biological material and isolating proteins.

The technique is patented and is expected to be on the market within a year or so. The company is also developing new types of filters and membranes made of glass fiber.

The fact is that GeDevelop's entry into biotechnology resulted from a downturn in the construction industry. Gullfiber, a manufacturer of insulating materials, was seeking new applications for its glass fiber materials.

One idea that took on concrete form and that is about to be introduced on the market is GeDevelop's use of glass fiber in bioreactors and as filters for separation processes.

GeDevelop is owned by Industrivarden and has about 70 employees. Four employees with three main subprojects are working at the laboratory at Ideon in Lund. The subprojects are separation, membranes, and bioreactors.

Glass Fiber In Reactor

The company believes that its new bioreactor will be on the market soon. Product tests are already underway at client firms.

In bioreactors, cells are immobilized and provided with a nutrient solution and oxygen. This creates a natural environment in which the cells can produce or break down some substance. This may be done to produce antibodies and antibiotics or to break down phenol. Animal cells, fungi, or bacteria may be used in the process.

The cells are usually immobilized by allowing them to attach themselves to the surface or to be incorporated into small spheres. GeDevelop, on the other hand, is offering glass fiber as the immobilizing material. It has several advantages.

Glass fiber is inexpensive. The material has its own bearing capacity and a high porosity. It has a large surface area to which cells can attach themselves--20 square meters per liter or more.

In addition, the material can withstand high temperatures and it can be used in autoclaves for sterilization.

It is also important that the glass fiber material is porous and layered in several planes. This makes it easier to supply oxygen and nutrient solution, thereby making the transport of nutrition to the cells more efficient. This is extremely important for increasing the production scale of the process.

Testing Surfaces

"We are now testing various surfaces in order to make different kinds of cells attach themselves as well as possible. The material is custom made for the various applications," said Gunilla Jonsson of GeDevelop AB. She is in charge of the bioreactor project.

Bioreactors for cultivating animal cells are now considered to be most interesting. They can be used to produce monoclonal antibodies, interferon, and other substances.

Filters

The combination of a large surface area and a high porosity makes the glass fiber matrix suitable for use in separation processes. This is true both of mechanical separations and chemical seperations involving materials of biological origin.

"This also involves modifying the surface by applying various coatings. This is an important part of our development work," said Soren Halvarsson, leader of the membrane project at GeDevelop.

Small-scale process development and evaluation of separation properties occur at the laboratory in Lund where Kristina Duner is in charge.

The fourth worker at the laboratory, Mats Lilje, is in charge of the separation project.

"We believe our glass fiber matrices for separation will be used on a large scale in the biotechnology industry. But we are not as close to marketing our products here as we are in the reactor project," he said.

Sundsvall Plant

The researchers in Lund work in close cooperation with the firm's headquarters in Billesholm. This office assists the Lund researchers with practical details, prototype construction, large-scale experiments, etc.

GeDevelop also gains biological and glass-ceramic expertise through its cooperation with research groups in Belgium and West Germany and with the technical institutes in Lund and Stockholm.

The company has a plant in Soraker near Sundsvall that produces custom-made glass fiber materials for further development at GeDevelopment. Both STU (National Board for Technical Development) and the Industrial Fund have provided economic support for the development work.

"We are also developing new filters of glass fiber material, but we are not as close to marketing these products as we are in the case of our bioreactors," said Mats Lilja, project leader for filter development at the company.

Contact:

GeDevelop AB, Ideon, Ole Romers vag 12, 223 70 Lund, telephone: 046-16 85 00.

Protein Structures Studied at BMC

Stockholm TEKNIK I TIDEN in Swedish No 1, 1987 pp 1, 16

[Article: "Researchers Use Supercomputer to Help them 'See'"]

[Text] With the help of powerful computers, it is now possible to "look into" molecule that form proteins, viruses, and other structures.

Pictures of the molecules are used in gene technology and for the efficient production of pharmaceuticals.

BMC in Uppsala is one of the leading centers in Europe for studying the structure of proteins.

The possibility of studying the relative position of atoms in molecules such as proteins, nucleic acids, and virus particles has increased dramatically in recent years. Developments in the field of computers are primarily responsible for creating these possibilities, since the process involves enormous quantities of information that must be processed.

Along with modern gene technology, this research can also be applied in so-called protein engineering and in pharmaceutical design.

Professors Bror Strandberg and Carl-Ivar Branden of the Department of Molecular Biology, BMC, Uppsala, have both worked in structural research for more than 2 decades. They have watched this research develop from purely academic research to research of great industrial interest.

The pictures on the opposite page are from BMC structural research groups and show examples of the structures of various molecules that have been charted by X-ray crystallography and computer graphics.

Supercomputers

"Obviously, powerful computers are needed in research of this type, in which such large quantities of information are processed. There may be hundreds of atoms in a single virus molecule."

"The rough calculations are now made on our minicomputer and the more detailed processing is done on the supercomputer in Linkoping. We would like to make these calculations here in an interactive manner, so that we hope to obtain a so-called mini-supercomputer for the Department of Molecular Biology," Prof Carl-Ivar Branden said.

These smaller supercomputers are in the 3 to 5 million kronor price range, compared to about 100 million kronor for a "real" supercomputer. Nevertheless, molecular biologists may find the less expensive computer to be more effective, since it could be adapted for specific needs. Such computers are called "bio-informatics work stations."

Pharmaceutical Industry

The large pharmaceutical companies of the world have already established their own structural research laboratories with expertise in X-ray crystallography and computer graphics. The pharmacuetical industry in Sweden wants to acquire this same experience and, for this reason, they want Swedish expertise in this field of biotechnology to keep pace with developments abroad.

For the structural research groups in Uppsala, this means purchasing their own interactive mini-supercomputer and more effective equipment for data collection (purchase of a surface detector).

One bottleneck in this work today is a lack of crystals for X-ray crystallography. Extremely high crystal quality is required.

In the future, it may be possible to produce these crystals at zero gravity in space.

Another helpful tool may be crystallization robots, capable of conducting thousands of experiments each day. There is plenty of work for robots of this type to do in gene technology today.

The research itself will probably proceed from the study of individual molecules to large molecular complexes. They are often found in cell membranes and perform important functions in the regulation of passage through the membrane.

The researchers are convinced that their structural research will give us new medicines for treating the cold virus, high blood pressure, and other ailments.

Industrial interest is so great today that commercialization of the achievements in this field may be expected within the foreseeable future, perhaps within 1 decade.

In addition to Carl-Ivar Branden and Bror Strandberg, other structural researchers at the Department of Molecular Biology include Assistant Professors Hans Eklund, Alwyn Jones, Anders Liljas, Britt-Marie Sjoberg, and Orlando Tapia, who have their own relatively independent research groups at the department. Together, they form a unit that is on a par with the best laboratories of this type in the world.

Alwyn Jones, for example, is responsible for an important computer graphics program that is used by structural researchers throughout the world.

Contact:

Biomedicinsk centrum, Institutionen for molekylar biologi, Box 590, 751 24 UPPSALA, Telephone: 018-17 40 00.

9336
CSO: 3698/347

MUNICH GENETIC CENTER ENGINEERS NEW PROTEIN

Duesseldorf VDI-NACHRICHTEN in German No 5, 30 Jan 87 p 20

[Article by Egon Schmidt: "Bacteria Work According to Newly Devised Synthesis Plan: The Problem Lies in the Correct Convolution of Long Molecular Chains"; first paragraph is VDI-NACHRICHTEN introduction]

[Text] Munich, 30 Jan (VDI-N)--It is not necessarily a "sensational research breakthrough" as some newspapers described it, but what was successfully done at the Munich Genetic Center is still a remarkable step forward: the first production through genetically engineered bacteria of a protein not existing in nature. Furthermore, this "artificial" protein is capable of binding with the insecticide DDT.

As Dr Ronald Mertz of the Munich Genetic Center, who played a key role in the synthesis of the new protein, explained in an interview with VDI-NACHRICHTEN, the idea for a DDT-binding "small protein only 28 amino acids long" originated with Prof Bernd Gutte in Zurich. Strictly speaking, explained the likeable and unassuming scientist from Munich, "he did the main work for the development of this protein." Mertz emphasized that this protein had been synthesized in Zurich years ago using a chemical method, that is, without the involvement of genetically engineered bacteria. It was also discovered that the chemically produced protein was already able to bind with DDT.

For the Munich researchers only one thing was interesting in Professor Gutte's protein: "Could our bacteria also produce it?" This would be done by using "methods known since the 1970's" to synthesize a gene which, when introduced in the bacteria, controls production of the individual amino acids and in correct order.

Hence, the novelty, Mertz stressed, is not so much the synthesis of the gene in question. "At present, this can be done in 1 week," especially since "automats can be used" which "greatly facilitate" this once extremely tedious work. The only new thing is that now "for the first time a gene which does not exist in nature can be introduced into an organism." Up to now, Mertz continued, only natural genes were used which were only modified at certain specific points of the double DNA helix.

At the Munich Genetic Center, operated jointly by the University of Munich and the Max Planck Society, it took Mertz and a colleague only about 3 months to synthesize a gene which matched Professor Gutte's protein. In doing so, they had to master a mostly "architectural" task connected with the dimensional structure of the target gene.

As Mertz explained, proteins are basically nothing more than long chains of amino acids which reflect almost exactly the chain structure of a given gene. These amino acids are synthesized within and by the cell according to that gene's structure. But the final proteins are no longer simple, thread-like chains, but a sort of "convolution" which contains the chain in a multifaceted pleated tangle. According to Mertz, "a particular protein is active only in this convoluted form."

The work of Mertz's group and other groups ultimately revolves around this crucial problem. Apparently, at present, it is still extremely difficult to predict in the planning stage of the "construction" of a gene or protein to be synthesized how the amino acid chain will fold, that is, what efficiency can finally be expected. It is true that modern computers help with appropriate prediction calculations, but "the day when we are able to completely construct new useful proteins is still very far away."

Regarding the new protein explicitly, Mertz noted, it binds "DDT not nearly as well as known natural DDT receptors" which are in fact better "by several powers of 10." Scientists in Zurich and Munich have synthesized the DDT-binding protein primarily because DDT is a simple, symmetrical molecule and also because it is well known to researchers. Finally, it represents a much discussed environmental problem...

The genetic engineer from Munich mentioned that work is under way in Zurich on an experimental basis with other elements which supplement the synthetic protein and could enable it to render DDT innocuous. Because, as Mertz explained, the new proteins do not render DDT harmless simply by binding with it.

However, he emphasized in this connection that it is not absolutely necessary to employ genetic engineering to render DDT and other environmental poisons safe because there already exist natural proteins against this poison, such as DDT-resistant flies and so on. It would be possible to start making them systematically useful to man.

Nevertheless, the work done in Munich has potential practical importance in addition to purely scientific interest. Once it is understood how to exactly precompute the structure of a protein clue being formed, then it may be possible to synthesize proteins that are useful for industrial processes and in many cases allow the replacement of "tough, chemical processes" with biochemical ones.

[Editor'sNote] Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 449, 11 Feb 87 on pp 14-15 reports on the developments at the Munich Genetic Center and adds the following on FRG genetic research: "Prof Hubert Koester of the University of Hamburg, founder of the Hamburg company Biosyntech, has presented four new proteins which, he says, are complete innovations. They are food proteins which, according to their inventor, may be used as medicines to treat certain illnesses or as supplements in foodstuffs."]

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CSO: 3698/M166

BRIEFS

NOVO INSULIN BY GENETIC ENGINEERING--Copenhagen--After 1 year of waiting, the pharmaceutical firm Novo can now begin producing insulin with genetically manipulated yeast. Back in January 1986, Novo announced that it wanted to produce insulin from genetically altered yeast (Saccharomyces cervisie). At that time, it was seen as a breakthrough in biotechnology (NY TEKNIK 1986:4). But the plans were halted by environmentalist groups that feared the release of genetically manipulated yeast. The storm of public opinion surrounding Novo caused Denmark to pass the world's first law on applied gene technology last June (NY TEKNIK 1986:25). Now the provincial government of West Zealand has given Novo permission to begin production in Kalundborg. Nevertheless, the battle in Denmark over gene technology is not over. The regional authorities who will monitor the application of this law lack expertise of their own. Even the national authorities are uncertain as to how the law on gene technology should be applied. A Novo competitor, Nordisk Gentofte, is having similar problems obtaining permits. Nordisk Gentofte wants to use gene technology to produce a growth hormone from E coli bacteria. [Text] [Stockholm NY TEKNIK in Swedish 26 Feb 87 p 6] 9336

EUREKA ARTIFICIAL SEED PROJECT--Rhone-Poulenc Agrochimie, along with Limagrain and the Swiss company Nestec, are among the partners involved in the latest Eureka biotechnology projects (see our 29 December issue, p 5). The three partners will pool their industrial expertise and research resources to conduct a project on artificial seeds. The designated goal is to "make this project a model capable of being subsequently extended to several plant species," Rhone-Poulenc stresses. The partners will thus be able to implement their studies, already underway, on bioreactor production of artificial seeds. Limagrain and Nestac will bring to the project their expertise in the field of plant cell cultures and their techniques for developing new varieties or cell strains. Rhone-Poulenc's specific role will be to study the cultivation in an uncovered field of embryos produced by this research, "using techniques and formation materials ordinarily employed for phyto-hygienic products." The French company will also develop "new active matter for the protection and nourishment of the embryos." This research program will extend over a five year period and has an overall budget of 21 million francs. [Text] [Paris CHIMIE ACTUALITES in French 16 Feb 87 p 6] 9825

CSO: 3698/339

DENMARK URGES SAS TO SELECT AIRBUS, NOT MD-11

Stockholm NY TEKNIK in Swedish 26 Feb 87 p 6

[Article by Staffan Dahllof]

[Text] Copenhagen--In its choice between the American firm McDonnell Douglas and the European Airbus, the airline SAS has landed in a hot political struggle. A trade war in the field of aviation is threatening to break out between the EC and the United States.

Washington and Brussels had hardly buried the hatchet in the dispute over American grain exports to new EC members Spain and Portugal when they threatened to dig up the hatchet again.

This time it involves the production of airplanes.

When officials from the Commerce Department in Washington visited Europe recently, they came with a warning.

According to the Americans, the European aviation consortium Airbus is using unfair competition. They say that Airbus is incapable of giving its shareholders a return on their invested capital. For this reason, Airbus receives government subsidies and can undercut its competitors, Boeing and McDonnell Douglas.

The EC rejects this criticism.

State subsidies to Airbus are quite similar to American defense orders, which are the economic backbone of the American aircraft industry, according to EC representatives.

Increased Interest

The two sides in this exchange are following the actions of SAS with great interest.

SAS has signed an option for 12 MD-11 airplanes from McDonnell Douglas for about 10 billion kronor. SAS planned to replace its DC-10 fleet with MD-11 planes. The deal must be confirmed before the end of March.

But now Airbus has offered to sell its A-340, which SAS has found worthy of a closer examination. The purchase of the MD-11 is no longer certain.

It is precisely this type of "aggressive marketing" that disturbs the Commerce Department in Washington. There have been no specific threats from the Americans, but the possibilities for SAS to obtain new concessions from the United States, which the company is seeking, will probably not increase if the airline purchases its new planes from Europe.

Within the EC, Airbus is seen as one of the more successful examples of European technological cooperation. The Danish press has called on SAS to support European industry and to decide in favor of Airbus.

Trade War

The trade war in the area of aviation that is now threatening to break out is one of several examples of how the United States is using political means in an attempt to regain lost market shares. This may be seen on the background of the extensive trade deficit of the United States with other countries.

The Americans have battled with the EC over steel quotas and grain. Last summer, after threatening punitive tariffs, the United States convinced Japan to introduce voluntary limitations on the sale of memory chips to the United States. The semiconductor agreement with Japan and the criticism of Airbus show that advanced fields of technology with high growth rates cannot escape the more and more heavy-handed competition.

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AEROSPATIALE STREAMLINES AIRBUS PRODUCTION

Paris L'USINE NOUVELLE in French 12 Feb 87 pp 7-8

/Article by Michel Defaux/

/Text/ Concurrently with an increased production rate which should reach eight aircraft per month in 1988-1989, quite another race has begun: that for profitability in fabrication of the A-320. This race is made still closer by the fall of the dollar, since aircraft prices are set in that currency. "In view of the competition from Boeing in particular, A-320 production costs must be cut by 20 percent to amortize general expenditures for the first 300 to 350 units," confides Jean-Marie Mir, director of Aerospatiale's Saint-Naziare plant, which expects to reach that goal by late 1988 or early 1989.

A plan to improve productivity at all levels has therefore been set up. First of all, production units will be specialized to enhance their efficiency. This policy has already been adopted in Germany by MBB, which did not hesitate to move entire plants to that end. Machined parts are now produced at Varel, moulded parts at Bremen, plastic and composite components at Stade, while fuselage panels are built at Einswarden and assembly is done at Hamburg. "We shall be a bit more prudent than the Germans. In my view, they overspecialized. But like them, we shall avoid having machining or assembly operations, for example, going on at the same time in several plants."

This radical change, which has already begun, will make Saint-Nazaire the production center for Aerospatiale's sheet metal and moulded components, with the avowed aim of raising it to first rank among European facilities for production of moulded components. Nantes, for its part, will specialize in composites and in mechanical and chemical finishing. Across the Channel at British Aerospace no such restructuring is on the agenda. The British approach--it is whispered in aeronautical production circles--is a bit "old hat."

Considerable further economies are expected from a reorganization of management in Aerospatiale's aircraft division. For example: up till now the

four plants in the group subcontracted parts to each other, whence there grew an inextricable web of relationships in which each sought to make a profit. "We shall correct that situation by no longer considering those plants as subcontractors, but rather as so many shops which will receive work orders." In the same way, a single system could be adopted for payroll management at the four plants. As always, data processing will provide that integration. A single data bank, from which each unit will be able to obtain its needed information, is in process of completion. "In that way we shall get closer to total integration, which we should reach in three to four years."

At the shop level Aerospatiale is heading towards decentralization, while planning for strict management control. This step is being prepared for by a campaign to make personnel aware of economic factors governing enterprises.

Then will remain the task of developing the productive facilities of each partner: a flexible machine shop; an automated riveting shop; a five-year project for a flexible moulding shop for small components as part of the Eureka program at Saint-Nazaire; a flexible sheet metal shop for British Aerospace in Manchester; a new building for assembly of 88 pairs of wings by 1991 at Filton; and a flexible moulded components shop for MBB in Bremen.

Capital investment remains stable for the immediate future: between Fr 40 and 50 million for the Saint-Nazaire facility. Increases are foreseen over the next two years, however, in order to meet the needs of the A-320's production speedup. Employment level will also stabilize after this year's planned reduction by 2,345 workers for the group as a whole. To meet extra costs, Aerospatiale will turn to subcontracting, which reaches 5 percent of output at the Saint-Nazaire plant and will rise to 15 percent by year's end. "We have notified our subcontractors that we are hunting for pockets of productivity. We shall help them progress, though without compelling them to make exorbitant investment commitments."

A final focus for research is the aircraft itself. Production and research personnel join to review solutions which might lead to reduction of the aircraft's cost. Begun a year ago, these studies have already had repercussions on definition of parts and on modifications of equipment or processes. The same step has been undertaken vis-a-vis providers of equipment, who account for a fourth of the aircraft's cost. "Before, we were buying a black box. Now the research people have a say in its design. They discuss each function. We must hit hard everywhere if we want to win," concludes Jean-Marie Mir.

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CSO: 3698/346

AIRBUS INDUSTRIE DEVELOPS FINANCING METHODS FOR A-320 SALES

Paris L'USINE NOUVELLE in French 12 Feb 87 pp 8-9

/Article by Marie-Jeanne Pasquette/

/Text/ For the A-320 Airbus Industrie will have the benefit of the most sophisticated financing techniques. That is in no way surprising, for "some Airbus orders represent sums as large as those for the cross-Channel tunnel," explains Jean-Yves Durance, commercial loans director of Credit Lyonnais. His bank, early in the 1970's, became one of the first to get a foothold in aircraft financing. Among his present working groups 15 people devote themselves entirely to aeronautical industry loans. "Next year there will be 25," he notes, thus highlighting bankers' determination to take their place in a market where competition grows ever keener.

More than any other aircraft, the A-320 will reap the first benefits from the financial imagination shown by banks. Why? Because it is a product which offers all the guarantees likely to win over the most reluctant financier. That is the opinion of Michel Magny, captain of the "aeronautics" team at Paribas, who has made a good analysis of the market. "An A-320 bought today at 20 /as published/ will be worth as much in 10 years," he thinks. "In the 100 to 180 passenger plane market it performs very well, and has no equal at the moment, since Boeing has announced its 7J7 will not fly before 1995!"

If he is that concerned today with the aircraft's future value, it is because more and more sales are financed by leasing, a formula under which the bank continues to own the aircraft until fully paid for. Leasing is usually proposed by a pool of some 20 bankers who form a holding company, which will control the aircraft and regularly check on its maintenance. The airline pays equal half-yearly rentals for some 15 years. At the termination of the lease contract it undertakes to buy back the aircraft at a residual valuation. If in the interval the airline should become insolvent, the banks recover the aircraft and place it with another airline. That is what is called financial leasing.

Another form of credit more and more often used is operational leasing. It is in fact very closely related to renting. Under the contract the airline agrees to rent the aircraft for two or three years only, most often from a leasing company which undertakes to rent the planes anew at the end of that period. This form of financing is highly successful. For reasons of flexibility American airlines now prefer to finance a fourth of their fleets by operational leasing. Here again the Airbus A-320, which enjoys a large market with 175 airlines as potential buyers, hods a major asset.

That success has several explanations. "When a buyer purchases an aircraft through leasing, he adds no indebtedness to his balance sheet," explains Jean-Yves Durance. "In the same way, leasing makes it possible to avoid adding to his country's foreign debt." This is a decisive argument for some Latin American or African states. Operational leasing has developed considerably in the United States as well, because of the tax advantages enacted by the government.

Although the Reagan tax reforms have eliminated some of those advantages, leasing will nonetheless remain the financial solution preferred by airlines. According to Tony Rian, chairman and managing director of Guiness-Peat Aviation--a leasing company with over 300 aircraft--80 percent of them were already unable to self-finance their aircraft purchases. Thus financial or operational leasing is very often the only form of financing acceptable to banks when the conventional export credit solution is not applicable. And this is very often the case. "Five years ago, export credits figured in half of all sales," explains Laurence Baron, financing director for Airbus Industrie sales. "Now, they represent no more than a fourth of sales. Their charges now exceed those of financial markets. As for their terms, they can never go beyond 12 years, whereas we have seen leasings granted by banks for 24 years, with the average running from 15 to 18 years."

At Airbus Industrie in Toulouse, Laurence Baron recognizes that aircraft builders must concern themselves more and more with financing sales of their products. Though it is true that the terms offered a buyer are never the determining factor in his choice of an aircraft, it is at times necessary to ensure that the buyer will have the financial means of honoring his order--on pain of being left with "white elephants" in the form of Airbuses ready for delivery, but which the customer can no longer pay for.

"Only rarely does the airline pay cash," Baron explains. "At times we simply act as brokers: we try to organize financing on the market by bringing airline and lender together. That is the ideal: a solution which represents no cost or risk for us." But things are not always that easy, and Airbus must share more and more of the commercial risks. Thus when Pan Am, about to go under, ordered 12 Airbus 300's and 4 A-310's, Airbus Industrie itself had to guarantee the stock issue by the company to finance a portion of the purchases.

In the same spirit an agreement has just been signed by Airbus and Guiness-Peat Aviation, the aircraft leasing firm which has just ordered 50 Airbus A-320's. The agreement provides that the European builder will share a part of the financial risk linked to the commercial operation of the planes by GPA. But in point of fact Airbus is only adapting to a practice which originated in the United States. There engine builders such as General Electric and airframe builders such as McDonnell Douglas possess, through the medium of financing companies of their creation, an air fleet leased to airlines. As a consequence, Airbus Industrie is seriously questioning the advisability of creating such an internal structure. "It is not hard to find funds to finance aircraft purchases," Laurence Baron points out. "It is only a question of risks. We already assume those related to research and development of models and to their manufacture. We are not so keen about taking on, as well, the risk arising from commercial operation."

6145
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OLIVETTI ARTIFICIAL INTELLIGENCE PROJECTS OUTLINED

Milan INFORMATICA OGGI in Italian No 27 Apr 87 pp 20-24

[Article by Cinzia Danalizio: "Artificial Intelligence At Olivetti"]

[Text] Officially born at the 1954 Dormouth (USA) seminar, artificial intelligence (the acronym is AI) has grown increasingly stronger over the years and today is experiencing a real boom. However, this field which, in Italy at least, was initially only an academic issue confined to the world of the Italian university, is coming to play an increasingly important role in the industrial sector. Today AI represents a rapidly expanding business.

In line with these trends, all the largest computer companies have developed AI centers in recent years. These centers, which vary in size, have the twin objective of acquiring existing know-how in the field and, at the same time, of promoting new research and developing new applications in this young science.

Olivetti, Digital, Texas Instruments, Xerox, Sperry, IBM,...all have developed AI centers of various sizes.

At Olivetti the establishment of a genuine AI laboratory goes back to 1 January 1985, although research in the field already had been underway for some time at the company (figure 1) [not shown].

The group as a whole is divided between two locations: Ivrea, and Cupertino (California).

The second location, at Cupertino in California, operates out of the Olivetti Advanced Technology Center (ATC), and its chief objective is to maintain constant contacts with the most advanced research centers in the world.

Right from the beginning, AI activity at Olivetti was oriented toward the rapid acquisition of know-how, an objective that cannot be achieved with in-house personnel alone. For this reason, the laboratory soon established contact with M.I.T., Standard, S.R.I., and Caltech, as well as with various Italian universities such as Pisa and Turin. Today, these still are the AI Center's main reference points, and some of the most important projects underway are conducted in collaboration with these institutes.

The formation of mixed teams of personnel from both locations, in fact, appeared to be the fastest way to acquire highly specialized know-how in the field.

From a commercial viewpoint, the goal of the group is not so much to construct individual expert systems as to offer customers additional added value; in other words, to enhance conventional data processing and office automation systems with the enormous potential of knowledge-based systems.

This is the framework in which the various projects currently being developed in this center must be seen, particularly internal programs such as those for quality control, software configurations for Olivetti systems, and so on.

Specifically, the AI Center's research program will focus on the following five important AI fields:
--AI development environments and languages;
--vertical development environments for the construction of expert systems (knowledge packages);
--expert systems (domain-oriented applications);
--natural language processing;
--workstations for AI applications.

Artificial Intelligence Development Environments

The AI center has implemented two general-purpose development environments to develop AI applications.

The first of these [two environments] is PLATO (Programming with Logic And Through Objects), an object-oriented system with logical programming capacity operating on personal computers (M24 and M28).

The nucleus of this system is constituted by OliSmalltalk language, an object-based integrated language, expandable by the user, and mouse-guided, with windows, heredity mechanisms, graphics, etc.. In addition, it is possible to open Prolog windows within OliSmalltalk, thus integrating object-oriented programming with rule-based programming.

The inferential engine available using Prolog is capable of processing in both forward and backward chaining. In addition, a toolkit has been added to the system to facilitate the development of AI applications.

The second development environment is CLEOPATRA, an expert system shell designed to aid the construction of expert systems on personal computers and workstations.

This system is based on the MRS system produced by Stanford University.

The objective is to integrate the powerful MRS reasoning methods and knowledge representations with a friendly man-machine interface.

Knowledge Packages Or Vertical Tools For Construction Of Expert Systems

Current research in expert systems is concentrating on identifying classes of [homogenous] problems and the most suitable software architectures for these.

The objective is to develop a general design scheme for each class from which the individual elements in the expert system can subsequently be drawn.

The term "knowledge package" is used to refer to this class of expert system.

Laboratories currently are working on the following knowledge packages:
--a semantic network manager (GIOTTO);
--decision support tool (AIDA);
--fault analysis and repair (ARCHIMEDE).

Of these packages, the last two are projects produced in cooperation with Stanford University and S.R.I. International respectively.

The first package, on the other hand, is an internal project or, in other words, a project conducted in cooperation with other Olivetti groups and designed to solve critical problems for these groups. Further projects are currently being defined. It must be emphasized that all these projects still are in the prototype stage.

Semantic Network Manager (GIOTTO)

GIOTTO is a tool that enables the user, through an interface or menu, to create, personalize, maintain, and consult a semantic network of frames. The format of the frames, the attributes, and their pointers are user-defined.

Direct access with a key also is allowed.

The personalization of the network consists in the fact that, for each piece of knowledge within the network, it is possible to define one or two owners with their respective rights.

Each frame also can have an associated text.

This tool has a vast range of applications: contextual help, storage and recovery of information in a non-sequential fashion, school lessons, dictionaries, and so on.

Decision Support Tool (AIDA)

AIDA (Artificial Intelligence & Decision Analysis) is a decision support tool based on integrated artificial intelligence and decision analysis technologies.

The latter is a methodology developed by Stanford University researchers that establishes standards for decisionmaking mechanisms.

This system was developed using OliSmalltalk, a Smalltalk environment for the Olivetti M24.

The structure of this system is outlined in figure 2.

Various layers of knowledge are wrapped around a general purpose shell. The first layer explains what decisionmaking (meta-knowledge) consists of; the second explains what decisionmaking in certain sectors (for example, real estate, the stock exchange, and automobiles) consists of: and the last layer supplies the interface with which the user communicates with the system (data input and output). This [interface] is a graphic interface that enables the user to follow the system's reasoning process step-by-step up to production of the final recommendation. This recommendation is not merely a piece of information or an answer, but a report explaining to the user what the problem was, the various alternatives, and, in conclusion, what the decision was and why. Different expert systems can be obtained simply by changing the knowledge related to the field under consideration.

Expert System For Fault Diagnosis and Repair (ARCHIMEDE)

One of the traditional themes of AI consultation systems is assistance in identifying and repairing faults. For this reason, Olivetti has developed a system in collaboration with Stan Rosenschein's team at SRI International. This system is the result of the integration of various tasks; each task is knowledge-intensive, in the sense that it can only be carried out if in-depth knowledge of the field is available.

The components of the system are a database [of facts] which represents the condition of the reference universe at all times, an expert system for fault identification, and a planning system for repairing faults.

In other words, it is assumed that a system of "sensors" (logical or physical) exists which transmits any variation in the condition of the reference universe to a special database [of facts]. In the case of an automobile, for example, this could consist of data of the following type: gas tank (full), gear (second); steering (45 degrees); etc. Some of this data is identified as faults (for example, "automobile (stopped) and location (in the middle of the street)"), and this triggers an expert system for fault "identification." This expert system applies the reasoning process to the condition of the reference universe by means of an inferential rule base which, in fact,

constitutes the knowledge of the equipment to be checked. In the case of an automobile, one of the rules will be "if automobile (stopped) and gas indicator (zero), then fault is gas tank (empty)." Once the breakdown is "identified," the corresponding repair operation must be found in the related table--for example, "fill (gas tank)." At this point, the problem becomes a classic planning exercise: that is, to plan the sequence of actions to be taken to transform the condition of the current universe, which contains the fact "gas tank (empty)," into a condition of the universe which contains the fact "gas tank (full)." This sequence of actions is inserted in the work cycle.

It is possible that, in executing these actions, another fault may occur. This either would retrigger the repair-identification mechanism or would determine that the suggested repair does not solve the problem. The feedback possibilities make the model highly complex.

Domain-Oriented Applications

The laboratory also is developing specific expert systems commissioned primarily by other Olivetti departments wanting to use AI technology to increase productivity. Some of these systems have already been produced and are now being tested by users, while others are still being developed. The following are worth mentioning:

--LAVOISIER (quality control): this system specifies the tests and test sequences to be executed on the Olivetti MOS [Metal Oxide Semiconductor] operating system to verify accuracy.
--LEONARDO (software configuration): on the basis of a (partial) description of the hardware configuration, the system applies an approximate and plausible reasoning process to define all the software configuration parameters for a given MOS operating system owner.
--MICHELANGELO (hardware and software integration): the hardware and software components of an Olivetti computer are tested together, following separate quality controls on each component.
--KANT (online terminal diagnosis): diagnosis of an SNA Olivetti terminal is conducted online and the user is provided with a description of the fault.
--VOLTAIRE (personnel management): the system analyzes a DBAse III database in order to evaluate employee career objectives and skills.
--KAFKA (diagnosis of chips): the system provides advice on possible chip faults due to production errors.

Natural Language Processing

Natural Language Man-Machine Interfaces (EINSTEIN)

Cooperation has been initiated with Cal Tech for a joint project in natural language interfaces. The objective is to provide personal computers with a

system that interacts with user language and establishes an interface with the database, the operating system, the application programs, and so on in a very open manner.

EINSTEIN can "speak" in French, English, and Italian.

The system is judged to be the first step toward true office integration with replacement of today's friendly interfaces (menus, windows, etc.) with natural interfaces. Hence, this represents a move toward a natural workstation which does not require the user to know of the existence (not to mention the name and operating mode) of each application program. Faced with a request in the user's language, it will be the system which handles execution of the appropriate program, or which responds: "I do not know how to do it."

Text Comprehension (OMERO) [HOMER]

In the field of natural language processing, research is currently being done in cooperation with Professor Ferrari of the Pisa Institute of Computer Linguistics. The system in question combines aspects of text comprehension and expert systems. The text being studied is subjected to linguistic and conceptual analysis, which produces a "conceptualization" of the specific text and, in addition, increases the system's long-term memory with all the new knowledge acquired during this phase. The system user can carry out two different types of operation: he can interrogate the long-term memory as if he were dealing with a database capable of inferring information which is not present; alternatively, he can define an expert system which will "apply reasoning" to the conceptualization, the long-term memory, and one of its knowledge bases to execute a certain task (for example, to send a copy of the text to all the parties involved, or to file the text in the most appropriate filing system).

Workstations

The most popular AI hardware-software configuration is a dedicated workstation for each user. In the ULISSE [Ulysses] project, four different versions of this workstation are envisaged:
--host AI workstation;
--delivery AI workstation;
--distributed AI workstation;
--terminal AI workstation.

The characteristics of the host workstation are designed to allow the creation of a comfortable, well-endowed, high performance environment to assist AI specialists in system development.

The host software is the so-called AI factory, a structured set of tools ranging from basic programming languages to vertical shells for the

construction of expert systems:
--user interface (natural language, voice, and image processing);
--operating system (Unix 4.2BSD, Unix V and MS-DOS compatible);
--Smalltalk, Prolog, and Lisp environments;
--shells for expert systems and technical libraries;
--various knowledge packages.

The delivery workstation receives the software applications produced on the host workstation. This workstation also is equipped with communication resources to facilitate user-interaction. The communication mechanisms supported by this type of workstation are based on three different hardware-software technologies: natural language processing, voice processing, and image processing.

Moreover, this workstation represents a "natural" environment for users, that is to say an environment in which he or she does not have to be aware of the existence, or know the exact name and the work methods of the application programs.

The distributed workstation, on the other hand, permits a sort of "distributed" problem solving in distributed environments such as local networks. In this case, the workstation operates like a knowledge server. Any other personal computer or workstation in the network simply actuates the user interface, while the knowledge server memorizes all the knowledge bases and triggers operation of the inferential motor.

Finally, the terminal workstation extends the work potential of the personal computer connected to the firm's mainframe computer. In addition to the software available in the distributed layout, a knowledge center is provided to help the firm in the construction of their applications.

This knowledge center makes it possible to move freely from normal data processing operations to the construction of vertical tools.

Research

Together with the development of these themes, the AI Center is working with universities in areas which are more strictly research oriented. One of the basic premises of our philosophy is that better knowledge representation means better "intelligence."

A deeper understanding of the issue is necessary if we want to deal with higher levels of intelligence, for example, in the development of expert systems capable of learning. A first step has been taken to improve current knowledge representation technology by integrating this technology with software engineering. In this connection, we are studying an architecture which makes it possible to break down the knowledge in an expert system into

various knowledge modules.

Each module represents specific semantic knowledge. We have noticed, in fact, that knowledge is often presented as a grouping of different types. However, vby memorizing everything in a single knowledge base, we ultimately make the expert system lose the "granularity" of the real world. In addition, this architecture ensures that the knowledge is re-usable, expandable, and can be changed.

A second research area involves learning. The DARWIN project proposes to develop an integrated architecture for the learning process in expert systems. The learning process is activated every time the expert system is unable to solve a problem. This process will consist in expanding the knowledge base by adding new rules, provided that these rules are consistent with the existing knowledge base.

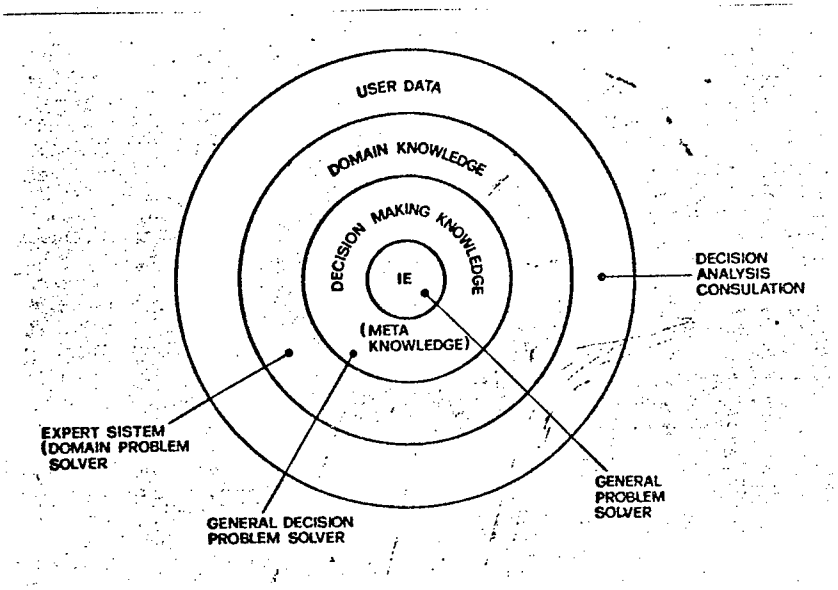
Two methods are used to achieve this objective: confidence fluctuations and non-monotonic reasoning.

When the system learns a new production rule that is inconsistent with the existing knowledge base, an analysis is carried out applying reliability factors (reliability of the new rule and reliability of the rules that conflicted with the new rule). Conflict resolution always turns out to be at variance with confidence. These confidence variances must then be projected backwards by means of a generalization process.

Finally, research is being done in approximate reasoning. Specifically, research is being done on the development of a "fuzzy reasoning package" for this purpose.

This package is capable of manipulating fuzzy sets (for example "high"), fuzzy qualifiers (for example "much"), and fuzzy quantifiers (for example "some"), and is equipped with a suitable inferential motor. The fuzzy expressions produce a confidence value; at each stage of the reasoning process the rule with the highest confidence value is taken into consideration and, in order to find this value, all the rules taken into consideration must be eliminated.

Figure 2 The Structure of the System



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SWEDEN: SUCCESS IN CMES, PROGRESS IN SUBMICRON CHIPS

Stockholm TEKNIK I TIDEN in Swedish No 1, 1987 pp 1, 12-13

[Article: "The Computer Chip that is World's First"]

[Text] Swedish development work in electronics recently achieved a higher international status.

A research group at the Teknikum in Uppsala recently succeeded in producing a new type of electronic circuit, a chip, that is called CMES.

Research groups in the United States have been working on the same project, but it was the Swedes who made the breakthrough.

In December of last year there was a celebration at the Electronics Department of the Teknikum at Uppsala University. The new computer chip worked. The Uppsala researchers were the first in the world to construct a CMES device.

The overwhelming majority of new semiconductor chips used in computers are developed in the United States and in Japan. Swedish researchers have not managed to produce their own revolutionary designs--until now.

The circuit in question is a new type, called CMES (Complimentary Metal Semiconductor). Today's conventional circuits can be divided into two main groups: bipolar and CMOS (Complimentary Metal Oxide Semiconductor). The former is fast and energy-inefficient, while the latter is slow (relatively speaking) and energy-efficient.

The technology developed in Uppsala is both fast and energy-efficient. Solar cells are sufficient for driving these circuits. It is seen primarily as a competitor to CMOS technology.

Insensitive

The new design eliminates several disadvantages of CMOS, such as sensitivity to electrostatic charge buildup and to cosmic radiation. For this reason, space and satellite applications are possible.

There are many possible commercial applications for the new technology, but it is doubtful that any Swedish company will invest in production.

The results achieved by the Uppsala researchers have gained international attention. Obviously, they are proud that they have achieved these results before other teams of researchers at Stanford, in Silicon Valley, and elsewhere, who are working to solve this same problem.

The results are also encouraging to the Swedish National Microelectronics Program, the NMP.

"This is a good example of how the greatest resources do not necessarily yield the greatest results. A breakthrough in research often comes as a surprise, especially when creative researchers are involved," said Soren Berg, the STU (National Board for Technical Development) official who is responsible for microelectronics research at universities and technical institutes.

Microelectronics research at the Teknikum of Uppsala University is supported by the Swedish National Microelectronics Program, NMP-3. Nevertheless, the resources are modest compared to those of many foreign research institutes.

New 'Lift'

Just 1 month before the breakthrough in Uppsala, workers at the Teknikum were given another "lift." That was when an ion-implantation device was installed. The equipment was too bulky to be taken in the ordinary way. Workers were forced to cut a hole in the roof and lift in the equipment with the help of a large crane.

The new equipment makes it possible for the researchers to produce integrated circuit components with line widths practically on the submicron level.

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CSO: 3698/335

RESULTS OF SIEMENS, ESPRIT GaAs MMIC R&D FOR SATELLITES, RADAR

Coburg MIKROWELLEN & MILITARY ELECTRONICS MAGAZIN in German No 6 1986 pp 558-563

[Article by E. Pettenpaul of Siemens AG, Components Division, 8000 Munich: "Computer-Aided Design of Analog GaAs MMICs"]

[Excerpts] 1. Introduction

Analog GaAs circuits are becoming increasingly important for applications in directional radio, radar and satellite reception technology. With the direct satellite broadcast receiver planned for Europe beginning in 1987, a civilian system application of monolithic GaAs microwave integrated circuits (MMICs) will for the first time be visible in large number. The military counterparts, comparable in size and complexity, are active phased array radar systems.

This article describes the first phase of the development of a microwave element library within the context of the EEC's ESPRIT research program. The focal point of this undertaking initially is to describe the micron and submicron single-gate and dual-gate MESFETs and the passive concentrated elements up to 12 GHz (up to 18 GHz by the end of 1986). In addition, the first part will be rounded out by a study of various passive circuits (networks, filters, couplers) as well as the development of a user-friendly CAD microwave package based on table computers. Over the next 2 years, models of distributive amplifiers and non-linear mixer and oscillator circuits will be worked out.

Based on the TV SAT reception components of a frequency convertor, the procedure for the development of computer-aided circuitry in the frequency range of approximately 1-13 GHz will be explained.

5. TV SAT Convertor

The receiving set for satellite television consists of an outside unit--a parabolic antenna with a low-noise convertor attached to it--which transposes the received signal to the intermediate frequency range, as well as an inside unit located near the television set with a channel-selective modulation transducer. The schematic drawing of the convertor in Figure 4 shows the necessary components: the high frequency amplifier, the mixer, the local

oscillator, the intermediate amplifier and the image frequency and intermediate frequency filter.

The first generation of these convertors will definitely be built using discrete components of hybrid technology. It is also clear, however, that an advanced monolithic GaAs design holds out the promise of noticeable advantages for the user, by reducing assembly and tuning time. We will next discuss the circuitry design and developmental status of such monolithic ICs.

6. Four-Wire Networks, Filters, Couplers

The most important applications for passive circuits are in networks for impedance matching, characteristic impedance transformation, filter circuits and cable couplers. In monolithic circuits, L-T or pi elements are used as simple, largely nondissipative reactance elements, an example being the matching of a real impedance to a complex one. Because of the capacitive character of the FETs in the GHz range, the reactance elements are generally inductive.

The filters needed for the satellite reception convertor--a band-pass filter for suppressing the image frequency and a low-pass filter in front of the intermediate frequency amplifier--can be constructed monolithically using microstrip elements, but also concentrated elements. The dominant factor here in terms of size and filter losses is the transformation ratio of the source to the load (< 3:1) and the quality of the coils.

The use of monolithic Lange or Wilkinson couplers, which are best produced using lambda/4 microstrips, for applications in the X band is not advisable, due in part to the chip surface needed in most cases.

7. Low-Noise Preamplifiers

Figure 6 shows the circuitry layout for a single-stage, monolithic amplifier for the satellite TV band (11.7-12.5 GHz) with a four-wire network. The goal of the circuitry layout is to find an optimally nondissipative reactance network, which on the one hand offers MESFET the source impedance for minimal noise and on the other hand makes it possible to achieve matching at the output with a voltage standing wave ratio [VSWR] of ≤ 2, as well as a transformation to real 50-ohm source and load resistors.

The actual transformation elements are L_2 and L_3 in the input four-wire network and L_4, L_5 and C_3 in the output four-wire network. The external elements L^*_2 and L^*_3 are not only for voltage lead-in, but can also serve as a component of the actual interface adaptor, if necessary. The technological application of the first Siemens amplifier prototype, achieved with concentrated reactance elements, is shown in Figure 2 [not included]. Similar amplifier designs were published by Hughes (9), NEC (10) and Toshiba (11), all of which used microstrip four-wire networks.

The medium-frequency results are rather consistent in showing a stage gain of approximately 9 dB, a noise factor of 3 ± 0.5 dB (thus, approximately 1 dB worse than the noise factor for the FET) and the difficulty of achieving a VSWR

of < 2 simultaneously at the input because of the high impedance transmission of approximately factor 3. The attractiveness of the design shown here lies in the fact that by using four-wire networks made of concentrated elements, the relative system surface needed is cut in half.

8. Low-Noise Intermediate-Frequency Wideband Amplifiers

Negative feedback circuits are a simple, but very effective method of wideband transmission. For applications of up to approximately 4 GHz, and especially for the intermediate band used in TV SAT reception, a purely ohmic parallel negative feedback coupler in series with a metal-insulator-metal capacitor is adequate insofar as the MESFET exhibits sufficient mutual conductance and thus gate width (12, 5).

Figure 8 shows a monolithic design of this type of amplifier on a very small surface. This component, marketed as CGY 40, is a further development of the CGY 21/31 dual-stage wideband amplifier (1, 2), the first monolithic GaAs IC on the world market (1981). The innovations involve the use of the very advantageous self-adjusting DIOM technology (13), as well as galvanic gold airbridges for the low-capacitance interconnection of the sources (5).

Computer simulation and the measurement of forward transmission consistently show an amplification of 9 dB in mid-band, a 2 dB bandwidth of 2.2 GHz and a noise factor of 3.0 dB with a guaranteed VSWR of < 2:1. The critical advantage of this GaAs IC over silicon wideband amplifiers--besides its small noise factor--lies in the fact that good dynamic performance is ensured (P1dB = 18 dBm). Source (5) contains further details and a comparison of published characteristics.

9. MESFET Mixer Circuits

Downward mixers with GaAs MESFETs have a significant advantage in the GHz range--at least into the X band--over conventional diode mixers in that they deliver a conversion gain instead of a conversion loss. In this way, for example, given a comparable mixer noise factor, the noise performance of a subsequent intermediate-frequency amplifier becomes less important, and low-noise preamplifiers do not necessarily have to have sensitive, multistage designs.

Furthermore, as the schematic drawing in Figure 9 [not included] shows, a simple lead-in of the signal is possible if dual-gate MESFETs are used as mixers, due to their intrinsic separation. Switching time can be reduced significantly, since input and output signals can be processed directly without having to use couplers. Besides a suitable low-pass filter, there is a particular need for an open lambda/4 microstrip, or a concentrated capacitance element against mass, in order to suppress the high-frequency and oscillator signal at the output.

The course of the function of GaAs MESFETs as a microwave mixer runs across the modulation of mutual conductance with the frequency of the sinusoidal oscillator signal. The procedure for calculating the four-wire networks and

drawing up the conversion matrix is provided in (14); the conversion is the subject of the ESPRIT R&D program.

Based on the measured results of the first hybrid components (15), as well as on our own lab samples, a wideband conversion gain of approximately 5 dB with a noise factor of approximately 8 dB will be possible from this type of mixer IC if the critical selection of the operating time and of the connections is optimalized.

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Figure 4. TV SAT (DBS) Convertor

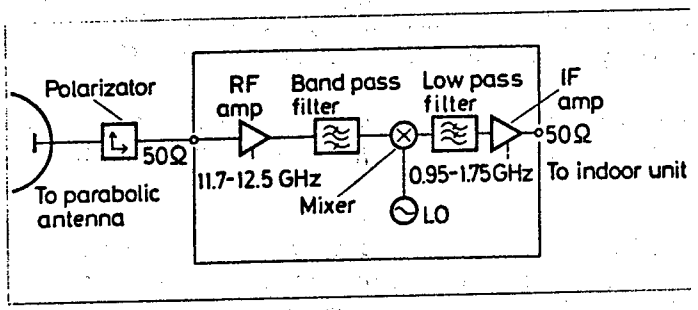


Figure 6. Low-Noise Preamplifier

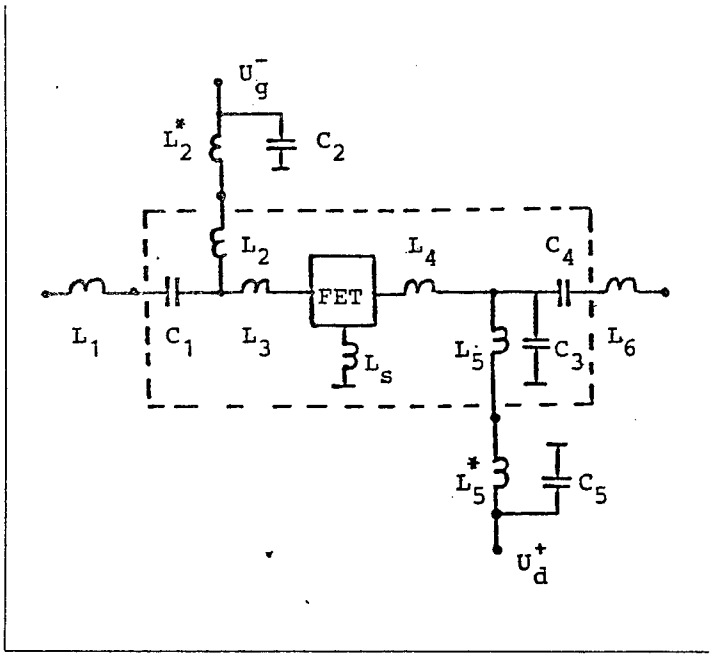
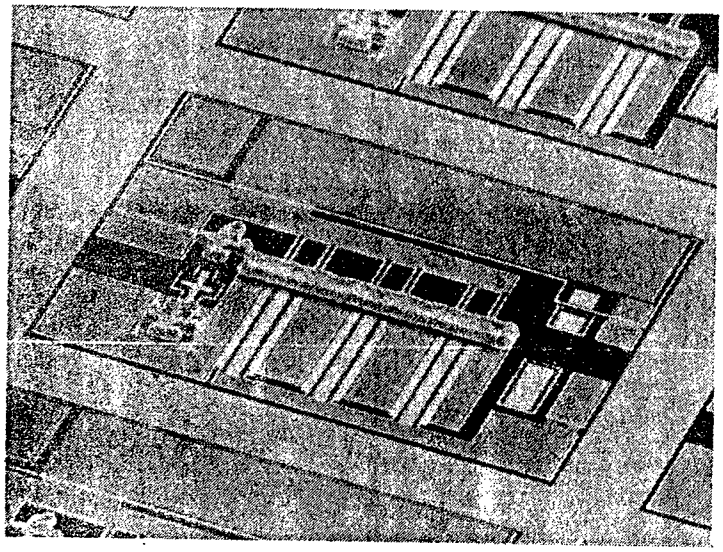


Figure 8. Chip Photograph of the Intermediate-Frequency Wideband Amplifier MMICs CGY 40 (Siemens AG) with Airbridge Interconnection



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CNRS OF FRANCE TO BEGIN HIRING OF SCIENTISTS AGAIN

Paris LE MONDE in French 7 Mar 87 p 9

[Article by Jean-Francois Augereau: "CNRS to Recruit Again"]

[Text] Recruitment and hiring of young researchers by the National Scientific Research Center (CNRS), frozen in June 1986, will finally be resumed for all disciplines except the life sciences. The was the decision made 5 March by Jacques Valade, the new minister of research and higher education, after consulting with labor organizations and obtaining the opinion of legal counsel. CNRS' operations have been blocked ever since the State Council, in accordance with a 12 May 1986 decision, nullified the 27 July 1982 decree article establishing the election procedures of the organization's national committee. The Council thought the disposition's rules distorted the principle of the election. Alain Devaquet, minister of research and higher education, decided at that time to suspend the work of the CNRS national committee sections, particularly the work of the recruitment competition jurys, blocking any hiring of young researchers for 1986. The State Council's move to nullify this decision last 13 February has opened up new possibilities for the new minister. This has created satisfaction within the tiny world of research, which was preparing to manifest its ill-humor next week. Although the minister's decisions certainly do not solve everything, they do have the advantage of restoring calm and putting an end to "a highly unstable situation which was causing uncertainty." Starting Monday, everything possible will be done to quickly convene the admission jurys responsible for recruiting research assistants. Competitive examinations for outside recruitment, which had been initiated in the engineering corps and had begun to be implemented, will also be resumed. This will put an end to the famous one-year contracts--slightly over 300 of them--which the CNRS was forced to draw up as a temporary palliative to the non-recruitment of young researchers and engineers it took on in 1986. According to the CNRS' general director Serge Feneuille, who describes himself as "relieved" by his superior minister's decisions, everything should move quickly from this point on. "Within a month, the final phase of recruitment of research assistants for the organization should be completed," he indicated, adding that 313 research assistant positions and 48 engineer positions were available to be filled for 1986. However, a number of problems relating to the recruitment of life science personnel and the nomination of research directors remain to be worked out. As do those concerning the promotion and temporary reassignment of CNRS personnel. That is why Mr Valade has requested the opinion of the report and studies section of the State Council: the lack of legal regulation in these areas is harmful to the proper functioning of the CNRS. An answer to this question is expected shortly.

9825
CSO: 3698/339

EAST BLOC ROLE IN GETTING DEFENSE SECRETS, TECHNOLOGY FOR USSR

Paris DEFENSE NATIONALE in French Apr 87 pp 21-31

[Article by Henri Regnard; first paragraph is DEFENSE NATIONALE introduction]

[Text] It is patently obvious that technological gaps between the USSR and the West are very sizable in many areas and that that situation, which is unfavorable to the former, is likely to grow worse in the future. That is why the Soviet Union has painstakingly organized the gathering of Western technical information through its friends, the satellite countries (1). In this article, Henri Regnard provides us with a very instructive picture of how the tasks are divided up among those countries.

The Soviet system for gathering scientific, technical, and technological information in the Western world is now familiar at least to specialists, if not to the general public. That system is cumbersome and complicated--a splendid example of bureaucratic centralization. It is geared completely to the acquisition, basically through espionage, of Western knowledge. The "Committee of the Presidium of the USSR Council of Ministers for Matters of Military Industry" (VPK) is the keystone of the overall system. Consisting of the 12 ministers heading ministries concerned with military industry, that committee has been headed since the end of 1985 by Yuriy Dmitriyevich Maslyukov, deputy chairman of the Council of Ministers and successor to Leonid Vasil'yevich Smirnov, who had held the post since 1963. The Committee for Military Industry is both a political and a technical management body. In that latter capacity, it defines and establishes research objectives for the five intelligence agencies that are responsible, chiefly through espionage, for collecting in the field (that is, in the West) information and documents relative to advanced technology and vanguard processes which will eventually strengthen the Soviet Union's military-industrial complex.

Those agencies have been numbered by the Soviets themselves, probably in the order of their importance, from I through V. Being intelligence services par excellence, the KGB (I) and the GRU (II) are the two most active and best-known agencies. But on the same level, and also devoting themselves to espionage, are the State Committee for Science and Technology (GKNT) (III), Agency IV, whose job it is to circumvent embargoes, and the Ministry of Foreign Trade (V) (2).

Section D of the KGB

The KGB differs from its fellow organizations and plays a distinctive role in the overall VPK system. It stands out in particular through its very specific activity as the coordinator of and prime mover behind the intelligence services of the Warsaw Pact countries, all of which participate to one degree or another in gathering Western scientific, technical, and technological information for the benefit of the Soviet Union.

In that activity, the KGB operates through "Section D," which gets its name from the Russian word "druzia," meaning "friends," and which for that reason is also called the "Friends Section." It is responsible to "Directorate T," which is in charge of science and technology within the first chief directorate of the KGB. Section D manages the contribution made by the USSR's satellite countries within the overall system, in which the VPK is the central driving force.

During the early 1980's, various intelligence services of the Warsaw Pact countries alone have supplied over half of the classified technology with military applications that has been accumulated by the KGB. Much of that information has had to do with data of maximum value in the hands of design offices in the military industry that are working on the latest and future defense systems. That ability to provide such effective support for the Soviet intelligence service is the result of growing development over the years--largely under Soviet orders--of the scientific and technical intelligence gathering organizations of the various East European services.

Dominant Role of East German Services

In the field of scientific and technical intelligence gathering, perhaps the subcontractor to the Soviet intelligence service which has yielded the most results in recent years is the HVA (3) (Main Intelligence Administration) in the MFS (4) (Ministry for State Security) of the GDR. That small agency is very efficient and has achieved many successes on behalf of the USSR, basically by gathering information in the FRG and countries belonging to the Atlantic Alliance. In fact, the Soviets have long regarded the HVA as their most effective intelligence instrument, in both human and technical terms, against scientific and technical targets within NATO.

There are many indications that the Soviets have assigned certain scientific and technical targets in the FRG and certain NATO countries to the MFS, those being highly specialized zones.

Although the day-to-day mechanisms of that close collaboration are not known to Western governments, several factors have recently been brought to light. The leaders of the HVA's organizations for gathering scientific and technical intelligence meet annually with the officers of the KGB's Directorate T, which is responsible in particular, as was noted above, for gathering and processing that kind of intelligence. At those meetings, the participants take stock of how the MFS has performed over the preceding year and establish objectives for the following year. In addition, the HVA's specialized sections receive

requests for information and orders from the KGB throughout the year. Those requests and orders are routed through the KGB's Berlin office.

Those efforts by the KGB have paid off. The Soviets have admitted in recent years that the GDR's intelligence service has gathered valuable NATO documents concerning NATO member countries. Some of those documents were stamped secret or even top secret. Some were concerned with politicomilitary subjects, but a high percentage of the classified documents dealt with nuclear matters. The HVA has also gathered classified NATO documents concerned with the planning of defense measures in connection with chemical and biological warfare through the year 2000. It has also obtained samples of protective equipment (masks, for example), identification technology, detection equipment, and protective clothing for study by the KGB and the Soviet Ministry of Defense. The success achieved in gathering information on chemical and biological warfare has not been limited to that taken from NATO. The HVA has gathered sizable quantities of documents on research relative to NBC defense and long-term research in the field of military medicine that was being conducted in West German institutes under contract to the West German Army's medical service.

The HVA has supplied the KGB abundantly in a certain number of other areas as well. In the case of energy engineering and science of materials technology, the intelligence services of the satellite countries provide nearly 20 percent of all the KGB's acquisitions. This is due in great part to the HVA, especially in the field of nuclear intelligence. Moreover, almost all information on tactical military detection systems has been received through the services of the satellite countries in recent years. The HVA has provided certain information regarded as being of very great value on the subject of technologies for position-finding detection in antitank combat.

But the East German service's greatest contribution to the KGB has been in the field of intelligence gathering through interception. This is true above all as regards the FRG and the efforts made by the HVA to pick up technical information on NATO.

In recent years, only a few of the KGB's residencies have collected significant information on those countries or on other intelligence services. But the HVA has supplied very elaborate syntheses and analyses and research notes based on hundreds of classified documents. In fact, that type of report from the GDR has been regarded as very valuable because it accounted for about 20 percent of all the production received at the KGB and addressed first to the CPSU Central Committee and then directly to the minister of defense of the time, Marshal Ustinov Dmitri Fedorovich, in the early 1980's.

Those reports dealt almost exclusively with the FRG's intelligence activities against the USSR. They contained information on methods of identifying Soviet military aircraft by technical means, an evaluation of the Soviet system of SA-8 antiaircraft missiles, a West German study of radio intelligence activities by the Group of Soviet Forces, Germany, information on West German plans for developing the airborne Vebal antitank weapon system, and the details of a NATO program for setting up an integrated antiaircraft defense system for West Europe within NATO.

Other reports and documents regarded as being of great value and obtained by the East German service for the KGB dealt with the most varied scientific and technical subjects, including: the 155mm guided antitank shell with a copper warhead; information on a new Chinese missile carrier; a U.S. analysis of Soviet experimental design work on laser technology; documents on the FRG's nuclear industry; and an evaluation by the West German Ministry of Defense of Soviet medium-range mobile ballistic missiles.

The distinguished services rendered to the KGB by the Ministry for State Security's HVA are not entirely due to the feelings of solidarity among socialist countries that are so often extolled. For years, and especially during the Brezhnev period, ties ascribing a particular level of cooperation to top-level political agreements were established. In fact, those agreements were largely concerned with Soviet concessions regarding the cost of energy and raw materials in exchange for the scientific and technical information gathered so successfully and easily by the East German intelligence service.

Intelligence Services in Other Satellite Countries

Although comparatively small in terms of what is supplied by the GDR, the contribution by other Eastern bloc countries to the Soviet system is not insignificant. In fact, it constitutes a valuable supplementary contribution. Its distinguishing feature is that it is provided basically by the military intelligence services. Generally speaking, we are seeing a probably temporary decline of the civilian intelligence services in the satellite countries.

The special Bulgarian services (the DS and RUMNO (5)) specialize primarily in looking for information in the areas of data processing and electronics. Noted in particular is the regular use of data processing trainees. Recent incidents have proven their participation in circumventing COCOM regulations to obtain embargoed U.S. computer equipment through French companies.

Moreover, Bulgarian transportation enterprises (SOMAT)--which were recently the subject of a French TV program that underscored their availability for transporting the most varied merchandise, weapons included, to the East--have been assigned a mission involving direct observation and spotting, as is shown by their propensity to park or "get lost" in the vicinity of sensitive areas.

Because of the ties they are developing with West Europe, the Hungarians rely on trade to increase their penetration of high-performance Western firms and acquire advanced technology in the area of data processing, which is one of their strong points.

In that respect, Hungarian commercial aggressiveness serves above all as a base for officers of the VKF-2 (6) (the Hungarian military intelligence service). Officers of the Hungarian special services are present at the political level, where they cultivate many human contacts. That very incisive activity in the European framework of the Strasbourg Assembly is in fact controlled by the Soviets, who try to benefit from it politically and, over the longer term, economically and technologically.

The objective is to open up European institutions (the EEC, the European Parliament, and the Council of Europe) to more active bilateral contacts with the Eastern bloc countries on the one hand and with CEMA (7) on the other.

It is interesting to note that in September 1986, the Romanians also proposed to the General Secretariat of the Council of Europe that talks be started with a view to their country's participation in certain of the council's deliberations. They based their argument on the precedent that had been set when Yugoslavia was admitted as an observer.

Very close to their Soviet counterparts---who appointed them to take over when 47 Soviets were expelled in 1983--the Czechoslovak services are showing great diligence and aggressiveness in pursuing objectives that include the scientific and military sectors. In that respect, recent incidents underscore the growing interest in NATO, new military technologies in aviation (the Mirage-2000, the Jaguar weapon system, technical data on the Magic-550 and Super-530 missiles, and the Alpha Jet) and the Eureka Project (French firms participating in the project, structures that have been set up, and so on), and the French attitude toward SDI.

We note that over the past few months, the Czechoslovaks have been paying particular attention to the--illegal--acquisition of as much information as possible concerning civilian security in France (organization, planning, material resources, technologies, dosimeters, gas detector capsules, devices for the detection of chemical weapons, NBC suits, and the toxic substance spectral analyzer) and the deployment of French troops in Chad (technical data on the Bap-100 antirunway bomb). Those two focuses of intelligence interest can naturally be tied directly to the Soviet Union's concerns following the nuclear incident in Chernobyl and Libya's position in Chad.

Contrary to a widely held opinion, the Poles (the SB and Z-II (8)) are also present in the Western theater of operations. But for reasons of domestic policy, their activity is more discreet than it was in the past.

This pattern of exchanges with the USSR applies even more to Vietnam, which is hoping to "rebuild" rapidly and which, acting through trainees stationed in France, engages in genuine all-out pillaging of anything (electronics, energy resources, telecommunications, and data processing) it might be able to offer the Soviets in exchange for the very sizable aid which it is currently receiving and which is guaranteeing the country's survival.

And Now Europe!

The USSR's bilateral relations with each of its European or non-European satellite countries are paralleled and, in practice, rounded out in the economic area by CEMA, a structure almost symmetrical to the Warsaw Pact.

Besides the adoption by that organization in December 1985 of its own program for the "scientific and technical progress of member countries through the year 2000" in five areas of development (electronization of the economy; automated mass production; the use of nuclear energy; new materials and new

technology; production and manufacturing; and biotechnology), we should draw attention to the way in which ambitions in connection with the desired scientific and technological cooperation with the EEC--ambitions stated by the organization's leaders on several occasions--have developed.

For the past several years, dialogue between the EEC and CEMA has been initiated through the secretary general, Vyacheslav Vladimirovich Sychev of the Soviet Union, who in 1985 expressed the desire to negotiate the establishment between those organizations of official relations aimed at starting them out "on the road that must lead to a determination of the areas in which cooperation could be contemplated."

The attempts by the Romanians and Hungarians to establish themselves in Brussels, Luxembourg, and Strasbourg are not isolated efforts. The Soviets themselves are exerting the necessary direct political pressure on European institutions. They have made it clear that they want East-West cooperation in "science, technology, transportation, energy policy, and agriculture." They have also let it be known that they hope to join in the Eureka program!

To further their plan, they are making skillful use of the current of opinion which already exists in the European Parliament and which was initiated a few years ago by several West German Social Democratic representatives. Those European deputies, along with others, are now hoping for a degree of East-West integration in Europe and bringing up the idea of economic complementarity to suggest, in the final analysis, that--as is true--East Europe constitutes a vast market for the EEC's investors.

According to the promoters of that thesis, the interpenetration of economies in Europe, particularly through an increase in the number of mixed-economy companies in the liberal democracies and in East Europe and through licensing agreements, ease of mutual investments, and above all a narrowing of technological gaps, is likely to contribute to detente in Europe. The outlook for such a development deserves the most careful study, and any decision made to move in that direction should be seriously weighed.

For the moment, we are faced with a situation of change that needs to be examined in the context of the reform taking effect on 1 January 1987 and aimed at easing the restrictions on Soviet trade with the West. That reform was recently given concrete expression in the establishment of the GKVT (State Committee for Foreign Trade), which has been headed since 10 November 1986 by Vladimir Mikhaylovich Kamentsev, who now occupies that post concurrently with his post as deputy chairman of the Council of Ministers.

Quite obviously, the opening-up decided on last summer by Mikhail Gorbachev and ratified by the Politburo is not free from strategic considerations. And we can be sure that the establishment in the USSR of enterprises involving Western capital and operating with convertible rubles will in every case be aimed mainly at increasing imports of Western technology.

The debates at the CEMA summit meeting held in Moscow on 10 and 11 November 1986 were centered on the economic integration of the Eastern countries, with

the USSR trying to promote technological improvement to meet its own needs. In exchange for finished products of better quality, it will allow its satellites to buy energy without paying for it in strong currencies.

The situation in the USSR with respect to the technological gaps separating it from the West is not likely to change much in coming years, and we must expect strong pressure in Europe aimed at overcoming those gaps by acquiring by every possible means, including espionage, the new technologies which the USSR lacks.

In fact, considering the relatively sizable number of Soviet intelligence officers expelled over the past few years and the strengthening of Western controls with respect to sensitive technologies, it is probable that the USSR will become even more dependent on its "friends"--that is, the intelligence services of its satellite countries which are responsible, as we have shown, for gathering scientific and technical information in the West: "That situation, inherited from the Brezhnev and Andropov era, has a very strong chance of being perpetuated." That is probably what will happen in the case of France, the FRG, and a few other NATO countries, because the USSR realized long ago that it was falling behind in the area of fast-developing military technologies, especially those being developed by the largest European arms firms in connection with the Strategic Defense Initiative.

FOOTNOTES

1. See DEFENSE NATIONALE, March 1987: "Microelectronics in the GDR" [article will appear in ELS/East Europe].

2. I: KGB (Committee for State Security), headed by Viktor Mikhaylovich Chebrikov.

   II: GRU (Main Intelligence Directorate, responsible to the General Staff), commanded since March 1963 by General Major Pyotr Ivanovich Ivashutin.

   III: GKNT (State Committee for Science and Technology), headed by Yuriy Ivanovich Marchuk. Alexey Mitrofanovich Kutepov may replace Jerman Mikhaylovich Gvishiani as deputy chairman.

   IV: Agency for circumventing embargoes (acronym and name uncertain).

   V: Ministry of Foreign Trade, headed by Boris Ivanovich Aristov.

3. HVA: Main Intelligence Administration, headed by Markus Wolf until January 1987.

4. MFS: Ministry for State Security.

5. DS: Drzaven Sigurnost or Dargjavna Sigurnost (Security Service).

   RUMNO: Rasusnavanetelno Upravlenie Kam Ministervoto Na Nadodnata Ohrana (Intelligence Directorate of the Ministry of National Defense).

6. VKF-2: Vezerkari Fonokseg-II (Second Directorate of the General Staff of the Ministry of Defense).

7. CEMA: Council for Mutual Economic Assistance; member countries: Bulgaria, Hungary, Mongolia, Poland, the GDR, Romania, Czechoslovakia, the USSR, and Vietnam.

8. SB of the MSW: First Department (Sluzba Bezpieczenstwa) of the Security Service, Ministry of Internal Affairs.

   Z-II: Zarzad-II (Second Staff Directorate).

11798
CSO: 3519/107

SWEDEN EXPORTS TO PRC POWERPLANTS, CONTROL SYSTEMS, TRAINING

Sundbyberg DATORNYTT in Swedish 11 Mar 87 pp 14-15

[Article by Bjorn Barnheim]

[Text] "China is an enormous and interesting market with incredible growth potential," said Paul Chan, chief of Asea's China office in Beijing.

Asea is one of many companies that have entered the Chinese market.

According to the current 5-year plan, which will end in 1990, China must build up and modernize its industry.

The Chinese are investing in an extremely extensive development plan. Primarily, the country is investing in modernizing its productive resources.

The powerful Chinese leader Deng Xiao-ping has openly shown great interest in Western technology. In recent years, he has also shown that he is prepared to go a long way toward improving contacts with the West and making it easier for Western companies to establish themselves on the Chinese market.

Asea is one of the many companies that have invested in the Chinese market.

"Our experience goes back to 1964 when the first contract was signed with a Chinese organization."

First Through Agent

Until 1983 Asea worked through an agent, the Danish trade company The East Asiatic Co Ltd. During these years the company received several orders and made many contacts within Chinese industry.

In 1983 Asea management decided to become more active on the Chinese market. The first step was to open an office in Beijing.

The following year, Asea executive vice president Percy Barnevik received an official invitation to visit China. It was a successful visit that resulted in stepped-up efforts on the part of Asea.

In addition to the Beijing office, the company also has smaller offices in Shanghai and, since the beginning of this year, in Guangzhou. These offices employ four and three persons, respectively.

"In 3 years, our work force has grown from three to 25 employees," Paul Chan said.

"We are also looking to see if the marketing conditions in other towns are right for opening up local offices."

Large Potential Market

China is a large country, the third largest in the world with a surface area of 9.6 million square kilometers. In many respects, it can be compared to the European or North American markets.

At present, under the influence of China's powerful leader Deng Xiao-ping, a decentralization process is being carried out. This will certainly open the possibility of establishing offices in various regions in order to get closer to decision-makers and customers.

From a business standpoint, Asea has moved in the right direction since it opened its own office. Recent years have been very good for the company.

New orders total between 250 and 300 million Swedish kronor per year. Nevertheless, the last 2 years have been called "low investment years" in China.

"We have done quite well compared to many of our competitors," Paul Chan said.

Two Areas Of Business

The types of business activities in which Asea is active in China can be divided up into two main areas. The first is Asea's traditional area of power transmission and distribution from 500 kV to 110 kV.

"We have delivered much equipment to local power distribution units. These have been the predominant orders we have received on the Chinese market," Paul Chan said.

During 1984 the company started marketing its products in the industrial sector, that is to say equipment for the processing industry. This involves primarily equipment for power distribution, motors, and instruments for monitoring controls and operation, but these orders were limited and were included in larger packages.

Local Effort

In order to succeed in the Chinese market, Asea is building up various technical resources, especially in the area of applications.

"If we produce in Sweden everything we want to sell on the Chinese market, we can never become competitive because of the long distances and because the costs would be too high," Paul Chan said.

For this reason, the company has opted for cooperation with local Chinese companies. These companies perform some of the design and installation work and are responsible for service and maintenance of the equipment.

"This form of cooperation has proven to work well and I am extremely optimistic about the future," Paul Chan said in conclusion.

Asea Training Chinese

The level of automation in Chinese industry is extremely low. For this reason, China is a large potential market for equipment used to control and monitor industrial processes.

It is only natural, then, that Asea is promoting its successful Master system on the Chinese market.

Asea has built up a unique training and service system in China.

In order to make a serious impact on the potentially large market, the company has opened its own training and service center in Beijing (Peking).

Geographically, China is far away from Sweden. For this reason, Asea has decided to meet the customer in his own home. The company has had an office in Beijing since 1983.

Asea is now building up various facilities around this office, some on its own and some in cooperation with local companies and institutions. There are two regional offices in addition to the Beijing office.

Since 1985 the company has built up a training and service system in China that is one of a kind, in order to market and deliver the control system Asea Master, for example.

"This is a major effort we are making. It is totally unique," said Kenneth Wiberg, who is in charge of export sales of the Asea Master to China.

"Normally, we work through subsidiaries abroad. This is the first time we are operating on our own. I believe strongly in this idea and having these resources in place is a strong selling point."

Large Potential Market

China is now a large potential market for manufacturers of equipment for automating industry. There is an enormous need to build up China's aging industry and increase its productivity, but the effort is limited somewhat by a lack of capital.

A study has shown that control and monitoring equipment is now being sold on the Chinese market for an estimated $80 million, or just over 500 million kronor, per year. This figure does not include pure instrumentation systems or simple PLC equipment.

"The market is truly enormous and why should we not get a piece of the pie," Kenneth Wiberg said.

Ten Systems Sold

"We have already sold and installed about 10 Master systems.

Asea estimates that it will sell Master systems on the Chinese market for about 8 million kronor in 1987. The goal is to double these sales in the next few years.

The American embargo on the export of high technology applies to the People's Republic of China, as well. But since contacts between the government in Washington and Beijing are good, it is considerably easier to obtain export permits for China than for other communist countries.

"We have had no problems obtaining export permits," Kenneth Wiberg said.

Own Training Resource

In order to demonstrate the equipment and train personnel to handle it, the company has established the Asea Master Training and Service Station. It is located at a research institute in downtown Beijing. The classroom is large enough for 10 to 12 students.

"For practical reasons, however, we must limit the number of students to about six in the technical courses," Kenneth Wiberg said as he showed us the classroom.

More students can participate in demonstration courses or more theoretical courses. This training is more general in nature.

Asea has produced special computer programs for the training. The students must fill in certain parts that are missing.

In this way, they learn to write programs and to insert what they have written into the main program. This helps them understand both software and hardware.

The demonstration equipment that has been placed in the training center has preprogrammed input and output signals. The students can use these to simulate events in a process and they can see the results of the operator's actions.

Training Through Interpreter

The first course at the training school in Beijing was held during the spring of 1985. It was a 3-week course for personnel at a Chinese cement factory that had purchased a Master system.

Kenneth Wiberg held the course in English and a Chinese engineer translated into Chinese.

"That was my first experience teaching through an interpreter. It took a little longer than expected, but it went well."

There are now two Chinese in Vasteras for a 4-month basic training course in the Master system. They will later become teachers and service technicians in Beijing.

These two are also helping translate the course literature into Chinese. This is being done in cooperation with a technical institute in Beijing.

"So far, we have translated and published a brochure on the Master system," Kenneth Wiberg said.

Still Alone

Asea is still the only company that has a training center in China.

"So far, none of our competitors have received permission to set up anything of this type," Kenneth Wiberg said.

Of course, utilization of the training center will be determined primarily by demand. This will depend on how well Asea does with its marketing and sales and on how many companies Asea can attract to come and look at the system.

"I believe that a practical upper limit for the number of technical courses per year would be around six with the resources we have today. We plan to train about 30 to 40 Chinese during 1987," Kenneth Wiberg said in conclusion.

9336
CSO: 3698/368

HUNGARY: PORTABLE WATER FILTER, DECONTAMINATOR PATENTED

Budapest UJ IMPULZUS in Hungarian No 3, 7 Feb 87 p 11

[Text] In our "Outlook" column (IMPULZUS, No 20, 1986, p 40) we reported on a little English device under the headline "Pure Water Simply and Cheaply." A portable water purifier patented by five Hungarian engineers serves the same purpose. It is suitable for producing drinking water out of averagely contaminated surface water. The device was well tested in Cambodia where Hungarian engineers working on construction of a children's town tried it out. And it did good service for the employees of Hungarocamion in Algeria, Iraq and Iran. Here at home the developers reduced the suspended material content of Tisza flood water from 700 mg/l to 7 mg/l with their filtering equipment.

During the process the water to be purified is passed through a sand filter aided by a clearing agent, an active carbon adsorber and parasite filter and then decontaminated with a hyposolution prepared on the spot with an electrochlorinator! Dechlorination is done by adding vitamin C (ascorbic acid). The advantage of the device is the on-site production of chlorine from table salt. In the case of averagely contaminated water the filters are suitable for production of 200 liters of drinking water without cleaning, and regenerating them takes only 20 minutes.

8984
CSO: 2502/37

HUNGARY: QUADRUPOLE MASS SPECTROMETER

Budapest UJ IMPULZUS in Hungarian No 2, 24 Jan 87 p 23

[Text] The debate of the candidate's dissertation (description of product) of Sandor Bohatka titled "Quadrupole Mass Spectrometers, Measurement Systems and Methods" was held on 8 December 1986. The quadrupole mass spectrometer is assuming an important role among reliable material testing devices. The author had a role in the domestic development and many-sided use of this. A family of quadrupole instruments grew out of devices with various measurement limits and providing various services and a line of special purpose equipment was built. He showed the interdependencies between the errors in geometric and electric parameters and the resolution, sensitivity and stability of the quadrupole mass spectrometer. A peak selector and a programmed version of it were prepared to control the quadrupoles. An instrument combination made up of a mass spectrometer and a Soviet-made gas-electron-diffractograph made possible, using an appropriate measurement technique, the determination of the molecular structure of metal halogenides vaporized at high temperatures. A respiration mass spectrometer, belonging to the international front rank, is being used in medical research. The five-channel gas analyzer is based on an automatically controlled, air cooled diffusion pump system and the two stage sampler makes it suitable for fast analyses. Also of medical interest are those measurements in the course of which they measured with a mass spectrometer the narcotic contamination of the air in operating rooms and of workers in operating rooms, helping to establish the degree of endangerment and showing the effectiveness of a protective system. The quadrupole-derivatograph connection significantly extends the analytical possibilities of the recognized thermoanalytic equipment of the MOM [Hungarian Optical Works], as is proven by the mineral-petrology research done. The measurement method and complex gas analysis equipment developed to analyze gases dissolved in ferment broths and given off by fermentors are suitable, when connected to a multiprobe sampling system, for multichannel gas analysis. For the first time in the world they succeeded in making a system which can continuously measure with a mass spectrometer the gases given off and the gases dissolved in real ferment broths in a number of fermentors, practically at the same time.

8984
CSO: 2502/39

HUNGARY: SUCCESSES OF VERSATILE SMALL COOPERATIVE

Budapest UJ IMPULZUS in Hungarian No 2, 24 Jan 87 p 7

[Article by Janos Kis: "A Hungarian Success--in the 'Apple Manner'"]

[Text] What formula should an enterprise follow to raise itself from nothing to one of the first? The economists gave the answer long ago--unsparing market competition tolerating no easing off, leading experts who love their work and are well paid, and a flexible innovation and market policy. When this comes up in engineering or economist circles they immediately add, "Here? This is unimaginable!"

"Silicon Valley? Such a thing cannot happen here," they are used to saying, again arguing from habit. But if we look around a little more closely a few successful undertakings can be found in our country too. One of the most dynamic domestic computer technology firms is the Instrument Technology Small Cooperative. It started as a GMK [economic work association] and as a possibility for it opened up (because it had outgrown the possibilities offered by this form) it transformed into a small cooperative. It is now breaking more and more into the Western European market with "license pure" equipment it developed itself, with supplementary accessories for computers. So much so that in the recent past it founded a mixed enterprise with a West German firm, with a headquarters there.

"Thus far we have reached two great ages in our history. Beginning next year we enter a third phase," recalled electrical engineer Gabor Szeles, president of the small cooperative, looking back on the events of the recent past. "The first age was one of learning. At that time we noticed that here at home there were not enough higher powered single and multiple user computer systems. We developed one from domestic and socialist parts. But the customers here too were seeking faster, more reliable, more many-sided systems with larger memory capacity. Then came our second age which lasted up to today. Using Taiwan and FRG parts we joined the ranks of those making IBM compatible computer clones. In addition, however, we began developments the goal of which was to weigh what we could do! Thus was created the TZ-80 microcomputer, based on the Z80 microprocessor, or a version of it--the TRANSMIC-8, the first domestically developed portable PC and, as far as I know, the only one even today. In the end we didn't pay for this 'stunt' because it turned out that a few special users needed just this. In this period we gathered not only expertise but also

patents. The international patenting procedure is now under way for our 'solid state Winchester' store, which is completely compatible with the traditional Winchester. The 'only' difference is that there are no moving parts in it so it is free of all the 'sickness' occurring in this type as a result of mechanical failures. When patenting is completed it can probably count on sucess on both the Eastern and Western computer technology markets. The routine and the technological experience acquired made it possible for us to join in the space program of the socialist countries; we are developing and making one of the members of the on-board computer system of the MIR space station.

"The research in the earlier developments was directed not only at IBM clones but also at 'license pure' IBM compatible machines. Thus we could create our TM-16/32 multi-workstation computer using a VYME-Bus system and based on the Motorola 68000 processor and the equipment, also being manufactured now, made with the Intel 80206 and Intel 80207 processors, which can be called very modern even now. In the meantime the Multicenter-Turbo developed earlier and based on the Z-80 processor had a great international career. We are selling this 8 bit, CP/M 2.2 and CP/NET compatible PC, supplied with an operating system we developed ourselves and which can serve eight workstations, in Western Europe on a license basis with the aid of FRG and Spanish enterprises.

"The EASTSTAR was developed by multiplying the performance of the IBM XT/AT and similar machines made on the basis of it--achieving a performance increase of 3-10 times depending on structure. This 'resource computer', compatible with the IBM PC's in regard to software and hardware, runs under the MS-DOS or Concurrent-DOS operating systems and has a good chance of success on Western, especially Swedish, markets. The 'big ones' left a market gap, because so far they have not come out with a general purpose computer which can operate with a maximum of 16 terminals in a network which would solve the data processing, planning and office tasks of smaller enterprises and offices.

"However strange it may sound, shortage items are not unknown on Western computer technology markets either," the president of the small cooperative said when we inquired about the developmental conception of the firm. "So we must find these gaps, because that is the only place we can get in. Consider, for example, the case of the Amstrad and Schneider firms producing IBM clones, and very successful too. They produce a good quality basic machine. We cannot compete with this, but the market for supplementary (so-called option) cards is completely open. This is a hardware selling opportunity which could mean larger volume sales. The foreign customers need primarily data concentrator and network cards. They buy these to a value of about 20-30 million FRG marks, so it is not worth it for the 'big firms' to deal with it. But for us this is a gigantic opportunity for business and to acquire experience. The criteria here are quality, reliability and price. Nor is it a factor to be neglected that the 'big firms' also 'bring to market' the supplementary equipment of other firms with their own products, so it is not necessary to spend for separate advertising."

On the basis of all this one can understand the optimism of the cooperative's president in connection with the success of their new "developmental age" using a Western parts base. In this way they can begin, in a way profitable to themselves and to the national economy, their offensive to end shortage items--in the West.

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HUNGARY: WORK OF COMPUTER TECHNOLOGY INSTITUTE FINDS MANY USES

Success Story

Budapest UJ IMPULZUS in Hungarian No 4, 21 Feb 87 pp 40-41

[Article by Janos Kis; "From TPA to IBM"]

[Text] The Measurement and Computer Technology Research Institute (MSZKI) operates within the Central Physics Research Institute (KFKI). Although they deal with both manufacture and research and development, market activity is not foreign to them either. They have conquered the domestic computer technology market with modern computer equipment manufactured by them which cannot be obtained from the West because of the embargo. Socialist countries also--including Soviet scientific research institutes--count on their equipment.

Many of the TPA-8 series computers, of scientific historical significance, still operate in Hungary. This was the first computer which could be used in practice which was entirely of domestic manufacture. Today these computers are obsolete structurally and especially theoretically. But the old peripheral interfaces and peripherals still operate perfectly. They are not as obsolete as the central unit itself so it is worth dealing with the idea of somehow saving them. They have offered the users of the TPA-i, TPA-s and TPA-1 to modernize their equipment by exchanging the central unit and some of the auxiliary equipment. The system thus obtained corresponds to the TPA-QUADRO, which is software compatible with the earlier equipment. This is a good bit cheaper than buying completely new equipment. Using the institute's TPA computers they built in the Soviet Union, based on locally developed software, the entire control and measurement data collection system for the TOKAMAK reactor to be put into operation in the near future. We thus joined directly into peak technology research connected with nuclear physics and nuclear fusion therein. A total of four such devices operate in the world, one of them in the Soviet Union, which the developers built at the same time as the foreign equipment. In the course of the work it was possible to exchange experience and information, although relatively little is published in Western professional journals about the practical results of such research and they are not happy to talk about it even at conferences. It is characteristic of the order of magnitude of the tasks to be solved with the TOKAMAK that it is necessary to constantly watch about 10,000 analog and digital parameters. A

distributed intelligence local network takes care of the complex task of controlling the magnetic field, demanding great precision, and processes the signals of the auxiliary equipment. In part the plasma diagnostic data thus obtained helps the research, but it also contributes to control of the equipment system.

The spread of business and CAD/CAM systems requires more and more "mega-mini" computers. So the activity of the MSZKI is supplemented very well by those few famous institutions and the many small undertakings which deal with IBM XT, AT compatible machines and with assembly of them. It represented significant progress in the domestic practice of system building that using the very widespread IBM machines and the "mega-mini" computers of the KFKI together they created a network architecture which contains in an integrated way both local networks and "local" networks embracing large areas. They have made great progress since starting to deal with computer manufacture and development. The newest products do not even resemble the original, which was a stored program analyzer. The machines of today are very complex, real "mega-mini" equipment, but they retain the old designation--the letters TPA [stored program data processing]--as a trademark. The modern, reliable machines will not cause marketing problems in the years ahead.

Hungary has achieved nice results in a few areas of hardware manufacture. For example, the KFKI participated in the VEGA program. A very great task fell on the MSZKI in developing the TV system for the VEGA space probe. Now, using the experience gained here, they are getting into the Soviet resource research program (known in the literature as the "earth program"), assembling image analysis equipment. Highly reliable peak technology is part of the everyday life of the research institute. They have won a number of OTKA [National Scientific Research Fund] competitions in this area.

At the MSZKI they have succeeded in uniting science, development, manufacture and trade in a way that should spread more in domestic practice.

Contrary Opinion

Budapest UJ IMPULZUS in Hungarian No 4, 21 Feb 87 pp 40-41

[Interview with Dr Mihaly Sandory, retired electrical engineer and former director of the MSZKI, by J. G.]

[Text] [Question] The MSZKI is an institution of the Hungarian Academy of Sciences. In addition to theoretical scientific work it deals with experimental researach and development, and in some areas even satisfies solvent demand. How can it simultaneously meet the expectations of its chief authority and the market requirements?

[Answer] It cannot. The medium in which we work has forced a "two-front struggle" on us. Moral recognition, foreign study trips, the possibility of teaching as a guest professor and individual material interest favored the sphere of abstract sciences. The other possibility was research and product development pertaining to tasks coming up here at home. We wanted to develop a professional level or standard which was higher than the domestic industrial average; this proved a drawing force for industry, and the institute had fewer obligations than industry. Nor were these jobs directly linked with any main

research trend, so the Academy was not unambiguously enthusiastic about our work; it esteemed only the possibilities for extensive development. The situation today is similar. It is the position of the chief authority that the international professional literature does not cite this work, the quality of the colleagues cannot be measured, so presumably it is equal to nothing. But if a researcher chose the other path mentioned above he can make only narrow use here at home of the expertise acquired abroad.

[Question] How would you explain the fact that on the one hand we have successfully operated peak technology while on the other hand one can experience some stagnation in intellectual-technical progress.

[Answer] A large part of the equipment operating under difficult conditions--space, power plants, mines--is really a peak achievement. The television system for the Vega space probe and the control system for the Paks nuclear power plant are examples of this. But in general the results achieved here cannot be published and do not attach to individuals, at most they attach to collectives. In most areas, however, it is pretentious to talk about peak technology. The root of the problem lies in the preparedness of those admitted to the Technical University (look at their scores) and in the ever lower level of instruction. I would even dare say that we ended engineer training in Hungary 15 years ago. A talented young person graduating from the Budapest Technical University can get a job as a researcher virtually at the moment of graduation; but to work as an engineer in industry he needs significant further training. He has to learn factory conditions and tasks too. Manufacturing technology is part of product development. They do not teach this at the university, or they hardly do, because the majority of the instructors have obtained such information at best only from books.

[Question] Where do you see a chance for further progress?

[Answer] Among many other things there is a need for training engineers with an industrial approach. To do this we would have to eliminate the present communities of interest. As they used to say half in jest, conditions will have to get a lot worse before they can begin to get better. I would compare the present situation in this area to a broad, straight road; but it is a deadend, and one can already see the end of it.

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HUNGARY: SOFTWARE ACHIEVEMENTS, GAPS

Budapest UJ IMPULZUS in Hungarian No 4, 21 Feb 87 p 22

[Article by Tamas Samathy: "Software Balance; Primarily in Work for Hire"]

[Text] In 1970 there was a total of 150 computers operating in Hungary, primarily in research and development institutions. Fifteen years later the gross value of the computer inventory exceeded 30 billion forints; the managing organizations owned 2,500 universal computers (small, medium and larger capacity) and 17,000 microcomputers. But even so we are not a software great power.

During 1985-86, thus in 2 years, several thousand PC's offering many services (IBM PC XT, IBM PC AT and other minicomputers, PDP type equipment) came into use through official channels or private import. But these machines need appropriate programs to be used well and usefully. While it is virtually impossible to survey the domestic software market there can be no doubt that such a market is developing. More than a few firms are offering no small number of programs. In addition to the larger state firms specialized for this purpose (Novotrade, Szoftinvest, the SZUV [Computer Technology and Management Organization Enterprise], the SZAMALK [Computer Technology Applications Enterprise], the SZKI [Computer Technology Research Institute and Innovation Center], Comporgan, Struktura, etc.) more than 100 small cooperatives, GMK's [economic work associations] and stock companies are offering their products and services under good-sounding names. But behind the varied picture there is a relatively scanty offering even today. One can obtain perhaps unjustifiably many versions of some software types--namely, the user is suffering from a plentitude of various data management programs. It is difficult to decide which products are worth buying for a given purpose for they are nearly identical. Not one offers substantially more than the others, while each maker tries to proclaim his merchandise the best, even at the price of disparaging the others.

There have also been examples where one partner asked 900,000 forints for software aiding enterprise management, while another asked only one third of that. He could do it because he could compensate himself for the balance shortage with tie-in goods in another area. All this shows that sometimes the prices on the market are unrealistically low or high.

But let us stay with prices a while. Seeing the drop in prices for computers made in large series out of circuit elements integrated to an ever higher degree many may observe that obtaining a good set of programs will eventually cost more than the machine itself. This fact does not justify the other user superstition according to which the investment will pay for itself if they use the PC more, if possible 24 hours a day. This is true only of large and medium equipment worth many millions. A personal computer offers personal services, cleverly used one can do many things with it, it makes work more rational, efficient and economical, but since it was not designed for it there is no need to operate it continuously in response to old reflexes.

A program is cheaper if it is made in a larger series and can be sold in larger quantities. In the United States and Western Europe a series of 10,000 or even 100,000 is not rare. In Hungary the manufacturer can count a program a success if it sells 150 copies, since virtually every software firm selling anything offers a fairly large number of programs solving general tasks.

Should we list what these general task solving programs are? The combined data processing and spreadsheet programs and those aiding analysis are well known. Everywhere there is a need for storing and maintaining databases and querying them according to criteria. Database management programs can be used for this independent of the several specialities. Text editors and general graphic display software supporting technical drawings are spreading. Recently there has been a growing need for expert logic programs. But with this we have shifted to the area of special software. Among domestic manufacturers the SZKI is in the lead here; it has come out with Prolog and M-Prolog for PC's. These are used to produce so-called shell expert programs, defining the knowledge, solutions, algorithms and logical connections for individual special areas. For example, programs useful in medical diagnostics, architecture, agriculture or geology are capable of drawing logical conclusions in addition to solving algorithmized tasks.

The usefulness of the programs offered might also constitute a subject for debate. Fortunately a unique division of labor has developed among the flexible small organizations making software for microcomputers. The party filling the order tunes the general applications programs (e.g., bookkeeping, wage accounting, spreadsheet) to the concrete task at the site. Thus one can avoid the local hitches deriving from the multiplicity of software.

If we are talking about the software market we should talk about the size of the domestic market and of export and import. We found the following 1985 data in the computer technology statistical handbook of the Central Statistics Office.

Base programs:	Domestic sales:	60,964,000 forints
	Ruble export:	18,115,000 forints
	Capitalist export:	136,000 forints
Applications programs:	Domestic sales:	442,584,000 forints
	Ruble export:	65,995,000 forints
	Capitalist export:	5,601,000 forints

The figures are reassuring, but here also we must dispel a false belief, that Hungarian software is outstanding and exportable. Thus far the software firms have exported mostly work for hire. Disregarding the internationally famous Prolog and not counting the less important and less significant game programs there is practically no truly successful Hungarian software on the world market. The intellectual products of domestic programmers will be confined within the borders of the country until there is the capital strength needed for advertising, management and the undertaking of greater risk and, naturally, until we have that "magnificent program resulting from very significant work." In addition to domestic development it would be important to import and spread some of the world famous software (BIBEZ [as published, dBase may have been intended], LOTUS, various integrated programs).

But artificial intelligence, the software for the newest, fifth generation computers, is a product on the COCOM list. It is self-evident that Hungarian natural language communication with these computers has not been developed. This also might be an exciting area for programmers.

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HUNGARY: POSSIBILITIES FOR SUPPLEMENTARY AUTOMATION NOTED

Budapest UJ IMPULZUS in Hungarian No 4, 21 Feb 87 p 14

[Unsigned article: "Supplementary Automation; Our Possibilities"]

[Text] In international practice--from Saargans to Osaka--there has been a development at the industrial level of the supplementary automation of producing equipment, because this sort of production development does not burden investment costs. Experts estimate that up to the end of the century there will be a need for supplementary automation of about 10,000 machine tools in our country. The results thus far, however, are not too reassuring.

Even in the last century machines--especially material forming machine tools--were made in such a way that the engineers tied many movements and operations to mechanisms; that is, they were automated. With the development of technology the level of automation rose. The industrial use of electronic devices created new possibilities for automation. As a result of the explosive development ever newer and more modern types of numerically controlled machines (NC, CNC) appear every day. The goal is to increase the utility or productivity of basic equipment.

There is a negative side to the extraordinarily swift technical development in that in industry equipment which is still valuable technically but which has low productivity works along side the newest equipment. With modernization and supplementary automation of this equipment they developed in the machine industry, for example, programmed tool movement and automatic workpiece and tool exchange and the improving productivity and favorably developing cost relationships proved the competitiveness of supplementary automation in technological development.

Throughout the world they have developed special enterprises specialized for this branch of industry which have specialized in equipment modernization as well as manufacture of elements for supplementary automation. Modernized, good quality basic machines produce intensively at the HILTI in Lichtenstein and at the Mazak in Japan, to stick with the examples mentioned in the introduction.

Here also there have been a number of initiatives to spread supplementary automation of valuable producing equipment, but without much result. A determining role in this was played by the joint resolution 104/1972 of the

National Plan Office, Ministry of Finance and Central Statistics Office--finally being modified--which classified as investment "... restoration or repair of used fixed assets which substantially increases their original capacity or precision."

Bringing in industrial and research experts the OMFB [National Technical Development Committee] prepared a study to analyze the problem titled "Domestic Possibilities for Supplementary Automation of Machine Manufacturing Producing Equipment." Analyzing the domestic and international situation the study summarizes its findings among which, without trying to be complete, we might mention the following.

Spreading supplementary automation is a way to spare the cost of technical-economic development. Even in earlier years there were a number of initiatives in this direction, but few undertook to manufacture and adapt the devices. In this regard the situation is more favorable today because, for example, the chief activity of the Machine Manufacture Development Society, formed in 1985, is to encourage specialized production and adaptation of these devices. The supplementary automation of producing equipment--basically machine tools--is also widespread in developed industrial countries and at the same time they are making increasing efforts to create more highly integrated machine systems. The theme committee preparing the study considers this parallel development to be something to be followed under our technical-economic conditions, primarily in machine industry parts manufacture, considering that this is one of our most limited industrial capacities and that a majority of the producing equipment operates here. It is characteristic of our situation that at most 15 percent of this machinery can be considered modern, and despite this it cannot be expected that this great backwardness will be fundamentally changed by the end of the century with NC-CNC machines or automated systems. Consequently the supplementary automation of a corresponding fraction of the existing machinery is urgently needed. Increasingly the development must spread even to machines which were originally numerically controlled. In the latter case we must create solutions as a result of which individual machines can operate without supervision, for example on night shifts or in favorable cases on weekend shifts. The role of electronics is expanding in supplementary automation, partly by improving the environmental conditions for serving the machines and partly with electronic devices built into the machines subsequently. The technical-economic effects of supplementary automation are: the utilization of working capital increases; organization, technological discipline and manufacturing quality improve; specific energy savings can be achieved; and the tensions deriving from the shortage of manpower are resolved in proportion to its introduction. The costs of development with supplementary automation are smaller than the costs of new, automated equipment and this cost difference results in economicalness. Relying on the estimates of experts, the study states that by the year 2000 there will be a need for supplementary automation of about 10,000 universal machine tools. During 15 years this development could bring extra profit of 10-15 billion forints.

One should not ignore the fact that some of the NC machine tools operating in the world already need supplementary modernization, primarily because in general it is difficult to fit them into the factory organization even today,

because of the overwhelming ratio of traditional machine tools (such a phenomenon can be experienced here at home too). Abroad also difficulties are caused for many enterprises by the shortage of pallet, tool or workpiece feeders or the unsolved nature of tool measurement. This also shows that supplementary automation would be useful for the Hungarian machine industry from internal and external economic viewpoints alike. It could be a new special manufacturing branch. By the year 2000 this developmental process could bring 10-15 billion forints of extra profit, which is more than twice the value of the present inventory of NC machine tools.

Domestic experts do not judge the role and significance of supplementary automation in a uniform way but the development of parts manufacture, for example, cannot be solved by urging with all possible strength the unjustifiably broad spread of so-called great automation. One should not forget that in the future also the inventory of traditionally operating machines will be signficant in the long term. Taking these circumstances into consideration the only realistic goal for the next 15 years is realization of proportional automation. The study makes recommendations as to what should be done: a survey of devices which can be used for supplementary automation, expanding the sphere of enterprises inteested in producing the devices and in the rational spread of them, and making more enterprises interested in accepting and using the devices.

The automation of manufacture is one of the chief trends in machine industry developments in the Seventh 5-Year Plan. In the interest of this program G/6 of the OKKFT [National Medium-Range Research and Development Plan] urges that a large part of central and enterprise sources be used for this purpose. Subprogram 1 of the G/6 program deals with R & D tasks for supplementary automation, thus aiding the acceleration of development.

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YUGOSLAV ROBOTS FOR GDR DIESEL ENGINE PLANT

Zagreb VJESNIK in Serbo-Croatian 11 Jan 87 p 7

[Article by Jovo Paripovic: "Seven Robots from Petrovaradin"]

[Text] There is no question that we find the best ways and means of breaking out of the crisis that holds us in its uncomfortable grip. Moreover, the world around us has troubles of its own and is not concerned with ours. Consequently, we must adapt ourselves to these conditions. When we come to admit this, we find the news such as that coming last week from the Pobeda IMO in Petrovaradin to be truly encouraging. This news is to the effect that the first consignment of robots made in Petrovaradin is to be shipped to the IFA diesel engine plant in Nodhausen, East Germany, in the near future.

It is just this report of the Petrovaradin robots that gives an indication of what we must do to emerge from the crisis and of how we are to adapt to business conditions even outside Yugoslavia so as not to lose our market share and business partners. It is also an example that we should follow, because we must show the world what we are capable of doing.

For years the Pobedin Machine Tool Basic Associated Labor Organization has been shipping the SP 12D hydraulic duplicating lathe, designed for machining "objects of complex spindle-like or cylindrical shape," to the GDR. It is a semi-automatic lathe operated by one person whose task it is to insert material, remove the finished product, and start the program cycle. In the last 5 to 6 years, about 20 such lathes have been shipped to the GDR from the Pobeda IMO. However, times have changed and it has been difficult to sell all of them, the reason being that the GDR is suffering a manpower shortage and needs a fully automatic machine which conserves labor. Hence our partners in the GDR suggested to Pobeda that it try to develop a machine which would eliminate human labor or at least reduce it to the minimum. In other words, the Petrovaradin plant was to exercise its technical skill.

Speed as the Watchword

The Pobeda plant accepted the challenge, but some time passed from the date of the order until the partners in the GDR were notified that the plant would start to work on the project. All the circumstances had to be weighed. Then a contract was signed, and a short time thereafter the details of the design

were fully settled. A team of development engineers was selected at the Pobeda IMO and moved out of the factory so that the team could devote its energies exclusively to this project. The team included Mile Vukelic, Laslo Kiralj, Kosta Spindler, Risto Mihic, and Branko Milosavljevic.

"This was one way of completing the design documentation in a very short time. All this required exceptionally great effort, and no objections were raised about the number of hours worked. The contract which we signed with our partner through 'Agrovojvodina' stated that we were to deliver seven fully automated hydraulic duplicating lathes," stated Milan Vukelic, chief design engineer at this factory.

The work bore fruit, and the first robots are now being assembled at the Pobeda IMO for the customer. This project was even given a special code name, Soca, which became a sort of watchword for the workers at this plant. When any object connected with Soca arrives for processing, all other duties are put aside and all attention is devoted to this project.

To put it in simple terms, the Pobeda IMO designers added to the SP 12D a manipulator to replace the hands of a human worker. We will try to describe how it works. A special lift raises material from a supply receptacle to the machining area of the lathe. The manipulator, the new "operator," inserts objects into the machine and removes them when machining is finished. This robot also represents the element which automatically takes chips away from the machine. There is also a special attachment for clamping the object to be machined and a device for automatic monitoring of wear or breakage of the cutting edge of the cutter.

A Yugoslav Product

All these lathes can be operated by a single worker, who does not become fatigued. Injuries and poor performance are also eliminated. All the worker has to do is deliver raw material in time so that the machine will not stop. An acoustic signal warns him if he forgets. And if he fails to hear the warning, the machine stops on its own, as it does when it begins to turn out objects whose dimensions do not match those assigned in the program. In the latter case, of course, the alarm is a signal to a technician that the machine is to be adjusted.

The performance of this machine is really exceptional. The time needed to machine one valve has been cut in half, and there are other savings, chiefly of labor.

The Petrovaradin robot may be said to be almost entirely a Yugoslav product. Only one electromagnetic coupling made by Siemens is built into it. Most of the work has been done by laborers and foremen in the machining and maintenance division of the Metalac Basic Associated Labor Organization. Of course, other organizations have cooperated in the project. For example, the automatic chip carriers are made by the Metalis divison of the Prvomajska Basic Associated Labor Organization in Donja Stubica, the compressor air fittings by Prva petoletka in Trstenik, and the lifts by Inomag in Backa

Topola, while the device for automatic monitoring of tool and machining element wear and breakage is manufactured by Iskra.

We were also told by engineer Vukelic that these seven robots will earn the Pobeda IMO 1 million clearing settlement dollars. Of course, this production will surely draw the attention of other foreign markets and factories in Yugoslavia.

6115
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HUNGARY: ACHIEVEMENTS IN TECHNICAL DEVELOPMENT HIGHLIGHTED

Budapest UJ IMPULZUS in Hungarian No 3, 7 Feb 87 pp 14-16

[Unsigned article: "New Developmental Trends; A Responsible Approach"]

[Text] "The results of the work of the National Technical Development Committee (OMFB) speak for themselves, the intellectual efforts made in the past quarter century are embodied in every branch of the economy," Janos Kadar, first secretary of the MSZMP, said, among other things, during his visit to the OMFB headquarters on 15 January. He added that when the Central Committee decided, last December, on an acceleration of technical development this put even greater tasks before the OMFB.

As we reported briefly in our previous issue the first secretary of the MSZMP was reviewing an exhibit showing the results of the technical development work supported by the OMFB and then at a friendly meeting he was informed about the activity and programs of the office.

Pal Tetenyi, a member of the Central Committee and chairman of the OMFB, gave a briefing on the work of the office and plenum. He said that in the spring of 1962 the Council of Ministers founded the OMFB to lay the technical foundations for the national economic plans. Its task extends to designating new developmental trends and initiating and aiding technical development.

The OMFB works up various questions in the form of studies and then, after professional consultations and debates, prepares conceptions--in justified cases.

Each year about 70 studies are prepared. These analyze the technical foundation for planning, new technical development trends, the utility of and conditions for domestic realization of some new technology, the social, economic, financial and personnel conditions for technical development, the status of a branch or problem area and trends for further development.

The studies and conceptions contain proposals which are used by the planning organs, ministries and enterprises. At its 28 December 1986 session the Central Committee could make good use of these studies in the course of working out the stand it adopted concerning an acceleration of technical development. (We publish the complete text of the stand taken on pages 26-28 of our journal).

In the 1960's the OMFB initiated and guided computer technology and environmental protection programs and a program for the industrial production of protein. At present the development of electronics, biotechnology and material conserving technologies stand in the center of its work.

A national biotechnology research program started in 1983. The OMFB developed conceptions from which one can expect practical results. One of these results was the development by Meriklon of a system for plant cell and tissue culture for potatoes and other useful plants which ensures new propagation and resistance. The procedure has been sold abroad (in England, Holland and Denmark) for several million dollars.

Phylaxia developed a procedure increasing the production of veterinary vacines by 50-80 percent. At Chinoin and Biogal they introduced a biotechnology (gene manipulation) production method for penicillin.

The OMFB directs a national research and development program to modernize technologies which conserve material and in the interest of secodary material utilization. Some of its results are given below.

The rolling technology was modernized at the Lenin Metallurgical Works. The life expectancy of present rollers has increased 10 times and this is accompanied by a saving of 8,000-10,000 tons of steel per year. Development of more corrosion resistant materials free of minium and organizing domestic production of cement additives are OMFB programs. This makes possible a 15-20 percent reduction in cement use.

The OMFB is responsible for programs serving development of the infrastructure for technical development. It is building up an information network for technical development, adding to the equipment of quality control institutes and laboratories and creating an instrument loan service, experimental shops and innovation parks.

The OMFB participates in government work. It compiles, submits to government organs and continually coordinates execution of the National Medium-Range Research and Development Plan (OKKFT). It makes proposals regarding financial sources for and regulation of technical development. It gives its opinion on the economic regulator system from the viewpoint of technical development.

Concerning implementation of the Sixth 5-Year Plan OKKFT they established that the efficiency of research and development increased by about 20 percent and that positive changes had taken place in the R & D base and in training of researchers. But the results of R & D activity are not adequately expressed in economic activity--national economic efficiency and the quality of products did not substantially improve and the ratio of new products did not increase.

Now they are preparing a government work program aimed at implementation of the stand taken concerning acceleration of technical development. Special emphasis in this will go to a modification of economic regulation which will better aid technical development. Interdependent with this is increasing the innovation readiness and possibilities of the enterprises. This task constitutes the backbone of all our work. It is a fundamental interest that we radically improve the freedom of movement and investment possibilities of the enterprises. The third important task is encouraging the human factor in technical development, education and training, forms of moral and material recognition and improving incentive earnings regulation.

"We are aware that technical development exists not for itself but for man and that it can be successful only by virtue of human work, thought and diligence. This is why we recommend turning special care to this question in the plan for the realization of the stand taken by the Central Committee," Pal Tetenyi said in conclusion.

Laszlo Pal, party secretary of the OMFB, said, among other things, that the political stands in regard to technical development recorded in the documents of the November and December sessions of the Central Committee had found agreement in broad strata of the technical intelligentsia. "Our experiences show," he emphasized, "that this technical intelligentsia is committed and ready to create for implementation of the resolutions; they would like it if we reckoned with them, counted on them and formulated proper requirements for them."

Pal Bansagi, chief of a main department, said that within the framework of national, ministerial and individual programs the OMFB supports research and development work, the introduction of new technological methods and the purchase of foreign intellectual products. The great majority of the supports are used directly by the enterprises. Research institutes and universities also share greatly in use of the centralized technical development fund.

Geza Odor, chief of a main department, gave a briefing on international scientific-technical cooperation. Last year, Hungarian-Soviet cooperation resulted in 150 new items of equipment, 30 new types of material and 60 new or further developed technologies. He described the first experiences in realization of the complex program of the CEMA countries for scientific-technical development.

At the meeting the first secretary of the MSZMP asked to say a few words. "We recognize the work of the National Technical Development Committee and watch its activity," he said and then noted that we often hear of technical development today, as if it were a key word. We talk about defining new developmental trends, about domestic introduction of new techniques, about everything which in connection with this might well serve the realization of our economic plans.

He emphasized: "Our tasks and problems are well known, but the way out is well known too. It was designated in November of last year by the Central Committee of our party at a basic and responsible conference and a month later this body

took a stand in regard to what tasks await us in accelerating technical development and increasing the effectiveness of scientific research. And what is most important, the Central Committee confirmed that we should not give up the goals put forward at the 13th congress of the party and our economic program outlined in the Seventh 5-Year Plan! We must work hard for their realization. We have left difficult years behind us, but there are still reserves which can be mobilized. Great strength hides in the purposeful uniting of working people, in the development of a new, responsible approach and public spirit. In performing our urgent duties an important task awaits the technical intelligentsia; perhaps this is why more is said today about them than about the humanities intelligentsia. Development has been such that today the development and spread of a modern technical culture have come to the fore, and with it necessarily the engineers guiding research, development and production. If we mention as examples the factories and plants producing outstanding results then we must list those where a level which can be measured by the international standard of technical development was made possible by well thought out scientific research, those where the resolution did not remain on paper. There must be differentiation in every area of management and people must be made interested, and yet more interested in production."

The first secretary of the party then said that in the past quarter century the National Technical Development Committee had been a good steward of the central technical development fund entrusted to it. When the Central Committee decided on an acceleration of technical development last December it set even greater tasks for the OMFB as well. "I am sure that in the course of implementing the new research and development plan now beginning the OMFB will again work successfully. The knowledge and useful experience accumulated by our experts over 25 years are a guarantee of it," Janos Kadar said in conclusion.

The Operation of the OMFB

The highest professional decision-making body of the OMFB is the Plenum, which has 45 members--university professors and enterprise and research institute leaders. The body meets 3-4 times per year and approves, for example, the annual program for study preparation. In 1987 they will prepare studies on main economic and technical development trends connected with long-range planning going beyond the year 2000, the development of the infrastructure, enterprise innovation ability, the role of machine manufacturing technologies in quality development, the status of and developmental trends in the precision engineering industry and the use of robots in agriculture, among other things.

A leadership conference takes care of daily operational matters. The presidential collegium deals with problems of greater urgency.

The personnel of the office numbers 186, that of the six offices under it comes to 72 (44 percent are college graduates). There are four main departments, two departments and 12 special secretariats with more or fewer personnel working in the office. The main departments take care of comprehensive, so-called functional tasks; the special secretariats take care of professional tasks, in close cooperation with the responsible ministries.

Financing Research

During the Seventh 5-Year Plan the OMFB will manage a central technical development fund generated from payments by the enterprises, for a total of 10.8-11.3 billion forints. Of this they used 3.4 billion in 1986.

The sum will be divided up as follows:

38 percent to support government programs (electronification or computer technology, economical use of materials and use of wastes, biotechnology),

13 percent for development of the infrastructure for technical research (instruments, information network, etc.),

20 percent to support ministerial programs, and

29 percent to finance other individual research which cannot be organized into programs (e.g., introduction of new techniques at producing enterprises and license purchases).

Distribution of the supports is based on competitions, but the lively, interactive contact maintained with producing enterprises also helps to assure that central support should aid the most burning problems.

The OMFB tries to support research and developments oriented toward an economic goal rather than basic research, to support projects which will have a fast and direct result in production, so the larger part of the development fund (about two thirds of it) is awarded directly to producing enterprises. The OMFB sets performance requirements for the winning of supports and imposes repayment obligations the magnitude of which can vary from 0 to 100 percent. To aid its work and take care of the above banking functions it established, jointly with the AFB [State Development Bank], the INVEST bank, which signs contracts in the name of the OMFB and takes care of payment matters. At present 1,000 valid research and development contracts are recorded.

8984
CSO: 2502/37

HUNGARY: LICENSES THAT SAVE HARD CURRENCY

Budapest UJ IMPULZUS in Hungarian No 3, 7 Feb 87 p 11

[Text] Enterprises conducting outstanding license activity were recently rewarded at the Ministry of Industry.

The Biogal Pharmaceutical Factory won recognition for taking over and utilizing a license for the Broncho-Vaxom capsule and for taking over the license and manufacturing technology for the Eryc capsule. The former fills a gap, serving to prevent colds. Only the domestic introduction of it was realized in 1986 but it can already show a saving of 4.7 million US dollars. Manufacture of the second, an antibiotic completely new in Hungary, results in replacing import worth 3.06 US dollars per box.

The Borsod Chemical Combine created an isoproturon manufacturing line with a capacity of 200 tons per year; this is one of the most significant elements for the structural shift in domestic manufacture of crop protection materials.

The Budapest Fine Knitted Goods Factory has introduced a comprehensive product modernization, a saving on imported primary materials, a quality improvement and organizational know-how which makes production planning and programming control more efficient. The Chinoin Pharmaceutical and Chemical Products Factory has successfully used Ciba-Geigy know-how in the manufacture of the medicine Trasicor. The EGIS Pharmaceutical Factory has realized base-total synthesis of Pindolol as the result of a license contract with the Sandoz firm and it has succeeded in taking over from a Swiss factory the Estulic tablet, a blood pressure reduction preparation with one of the most modern effective mechanisms in the world.

The license activity of Ganz-Mavag has accelerated also. It has prepared for manufacture of a locomotive bogie suitable for high speeds; they expect a significant production increase from this in the period ahead. At the Kispest Textile Factory they have successfully adopted a duplex patterning procedure taken over from the Dutch Stork firm. The Hungarian Pharmaceutical Industry Association also received an award for creating a computerized system in the interest of swift, professional license information flow. Thanks to this agreements were made recently only for the most modern products and there was no parallel license purchasing in the pharmaceutical industry. Among those rewarded the Pecs Leather Factory purchased know-how for the manufacture of

soft grain leather suitable for shoe uppers; the expenditures were earned back within 9 months. Remix created a modern hybrid circuit manufacturing plant thanks to a license purchase. Starting up the producing plant will make possible replacement of significant capitalist import; for example, Remix is already manufacturing circuits the Telephone Factory earlier obtained from ITT as well as highly reliable RIFA circuits. The expected sales receipts of the plant will be 440 million forints by 1990, and the dollar expenditure will be earned back within 3 years.

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SIEMENS PLANS TO INVEST HEAVILY IN TELECOMMUNICATIONS SECTOR

Buenos Aires MERCADO in Spanish 19 Mar 87 pp 55-58

[Article by Edgardo A. Silveti]

[Excerpt] Siemens' Presence in Argentina

The Siemens organization is involved in Argentina's industrial sector through a number of different companies: Equitel (telephone lines, telephones, communications exchanges); Redcom (planning, installation, and maintenance of external equipment); Osram (incandescent bulbs, fluorescent tubes, headlights for cars, traffic lights and special equipment for photography and filmmaking); Cimet (medium, low and high voltage copper and aluminum conductor cables, coaxial cables and special cables for communications); Electromac (threephase motors and generators); Standard Electric (copper cables for communications); ENACE [Argentine Nuclear Power Plants Enterprise] (planning, design and construction of nuclear power plants); and GTE of Argentina (hybrid circuits, radiocommunications, and telephone multiplex equipment).

In some cases Siemens owns all of the stock, while in others it is a minority stockholder, essentially providing technology. (See the chart on the following page entitled: "Siemens in Argentina"). Siemens' investments in Argentina may be calculated at approximately $200 million in assets at current values, and an additional $150 million in credits granted to clients. About 5,700 people work directly for the Siemens complex in these eight companies, in which Siemens owns anywhere from a maximum of 100 percent to a minimum of 25 percent. Its annual billing during the past fiscal year was a total of 260 million australes.

New Investments

Siemens' activities in Argentina are based on two interconnected actions, investment and technology transfers. The engineer Herbert Steffen, the head of the Siemens group in Argentina, explained that "just in the Equitel plant alone (a specialist in telephone lines, exchanges, telephones, and simple and highly complex telephone equipment), over $25 million has been invested in the last 6 years, and in the next 2 years there will be a new wave of investment,

amounting to $27 million." These figures have a very special dimension, for the largest part (75 percent) of this amount has had and will continue to have as its destination high technology production and testing equipment; only a small part of it is used for building construction.

Siemens in Argentina

Company	Siemens' Participation	Participation of Other Parties	Employees	Annual Billing--in Australes
Siemens S.A. Central administration; factory in Villa Adelina	100%		1,078	46,342,000
Equitel & Recom Factory in San Martin	100%		1,882	80,861,000
GTE Factory in City of Buenos Aires	100% through Siemens of Germany		190	11,000,000
Osram Factory in Boulogne sur Mer	66% through Osram of Germany	34% General Electric of United States	650	36,197,000
Cimet Factory in Leon Suarez	48%	52% Local stockholders Gurovich family	255	14,636,000
Standard Electric of Argentina Factory in San Isidro	47%	53% Local stockholders Juncal group	749	42,029,000
Electromac Factory in Lobos	38%	62% Local stockholders & through Stock Exchange	195	5,741,000
ENACE Offices in City of Buenos Aires	25% through KWU of Germany	75% National Atomic Energy Commission	701	23,593,000

"The entire Siemens group in Argentina," added Steffen, "has invested $50 million between 1983 and 1986, and for the 1987 to 1990 period, its investment will be another $53 million.

The Equitel plant, located at kilometer 18.5 on Route 8 in the San Martin district, opened in 1958. Its origin goes back to a contract signed by the then National State Telephones Directorate and Siemens & Halske of Germany and Siemens of Argentina, to supply switching equipment and telephones. The agreement stipulated that Siemens would set up an industrial plant with a high level of Argentine participation.

Since that time, the "Route 8" factory, as the Siemens people familiarly call it, has supplied over 1 million telephone lines and telephones for ENTEL's public network, and thousands of other lines and phones for private exchanges.

Nonetheless, everything is changing as a result of an international bid for which the process was started in 1979, with contracts awarded in January 1982, which were renegotiated in 1986, amidst tough competition. On the basis of prices, modern technology, and reliability in deliveries, only two firms managed to survive until the end.

One was NEC-Perez Company and the other was Equitel and Siemens AG. The latter got a contract to supply and install 150,000 telephone lines using electronic technology and 432,000 telephones. At this time the Siemens' work load for the 1987-1988 period is 260,000 digital technology lines (MSWD); 40,000 electromechanical technology lines (MSD); and 600,000 telephones.

New Technologies

Equitel has already begun its mass production of an electronic telephone (Masterset 113) in which the conventional bell will be replaced by a piezo-electric ringer. Instead of electromechanical components, this telephone uses integrated circuits; its modern design (it is available in light gray, beige, dark red, green, light brown, and dark brown) and the technological development were both done in Argentina, after 18 months of work.

Its most significant feature is its use of digital technology which transforms the voice into signals which are coded and decoded during transmission. This means that it will be possible for Argentina to have modern communications in the future. "Today's world," commented Steffen, "increasingly needs a larger volume of information that has to be transferred on everyday activities, such as stock market operations, bank transactions, business management, or education. This is creating a need for a much more advanced and efficient system. For side by side with traditional telecommunications services such as telephone, telegraph and telex, we are seeing an increasing use of low and high-speed data transmission, remote control and command of industrial operations, teletex and telefax, mobile phone systems, image transmission by cable, videophones and videoconferences."

In most countries these services are provided by at least two or more separate networks. This requires a large infrastructure, doubles investment

and maintenance costs, and also has the built-in limitation that customers need separate connection lines for their terminal equipment. Because of the advances in microelectronics and fiber optics, future systems will use an ISDN [Integrated Services Digital Network]. This means that there will be a single network operating with high transmission speeds (64,000 bits per second) with a definite improvement in transmission quality and a reduction in costs because of a decreased use of electromechanical components.

The first step toward a unified network for voice, text, image and data transmission is the introduction of digital transmission and switching on the present telephone system. Siemens is now working on this job in Argentina. Based on what will in the future be known as ISDN, it has developed the EWSD system, which has now been purchased by over 30 companies in 22 countries, which have installed 4.5 million telephone lines.

The name EWSD designates a family of digital electronic public switching exchanges controlled by computers which use programs for local, long-distance, mixed and international services. They are flexible and can be adapted to meet the conditions found in each country, and do permit a gradual evolution toward a single ISDN system.

Now in Argentina

According to the terms stipulated by the contract for the telephone lines and telephones, Siemens pledged to make the investments needed to build EWSD exchanges in Argentina, using a high degree of domestic integration. This is now a reality. Equitel has already built the first exchange of this type; it will operate in Mar de Ajo with 2,000 local lines and 1,500 long-distance lines.

In 1983 ENTEL contracted with Siemens to supply a digital EWSD exchange made in Germany, as an interest-free loan with an option to purchase. This exchange was installed in Cordoba, where it serves as an automated long-distance and international exchange. It has 3,192 interconnections, 200 of which are used for international traffic via the Bosque Alegre ground station in Cordoba province.

This international center provides connections with major nations of the world, offering an alternate route to the Balcarce station. It has also improved connections with nearby countries by means of ground links. After a year of testing while in actual operation, it was officially inaugurated in October 1985.

It is worthwhile to get a brief idea of the complexity of modern telephone exchanges. They locate their own defects, report them via a telephone line to the Diagnostic Center where the problem is recorded and corrected from a distance, without the customer even being aware of any problem. Steffen

announced that not only is Siemens already building them in Argentina, but it has also begun the development of a digital technology telephone exchange that will be able to operate as an independent exchange with a capacity of 100 to 1,000 customer lines.

This type of exchange, which the worldwide Siemens group does not list in its product catalog, is being developed for Argentina's rural market and for small towns, as well as for export. A staff of 30 engineers is working on this at the Equitel Technical Development Center at the San Martin plant. The first prototype should be ready by mid-1988.

Other developments include communications software and a small private exchange which has been named the "Multiset," as well as equipment for direct links between conventional analog-type exchanges and digital exchanges. In all, a staff of 100 engineers is working on research and development in specific areas.

From "La Portena" to Atucha II

Siemens' first involvement with Argentina dates back to the time of the Urquiza presidency. In August 1857 a telegraph system manufactured in Germany by Siemens & Halske was put into service, along with the brand new Western Railway. Among other things, this telegraph announced the departures of the train pulled by the legendary "La Portena" locomotive, starting from the terminal station in the vicinity of what is now the Colon Theater, until it completed its trip in Flores.

Since then Siemens' presence in Argentina has grown and spread by means of public works, electrical and communications equipment projects. The following list gives some of its more important projects:

a. Construction and equipment of the international Transradio company (1920).

b. 2,200 meters of protective walls built of reinforced cement along Avenida Costanera Sur (1924).

c. Supply and laying of telecommunications cable under the river between Buenos Aires and Colonia in Uruguay (1931).

d. Construction of the Cacheuta Hydroelectric Power Plant in Mendoza, which at that time was the largest of its type in South America (1932).

e. Construction and supply of underground equipment from Retiro to Constitucion, and from Florida to Palermo (1934).

f. Construction of the Obelisk of the city of Buenos Aires, Avenida 9 de Julio, the Colon Theater, Opera Movie Theater, and the School of Medicine of the University of Buenos Aires (1935-1937).

g. Supply and laying of 1,200 kilometers of coaxial cable and auxiliary equipment with three links, connecting Buenos Aires with Rosario, Santa Fe and Canada de Gomez to the north, with Mar del Plata to the south, and with Chivilcoy to the west (1954 to 1963).

h. Construction and equipment of the San Nicolas thermal power plant with an installed power of 300 MW (1956).

i. Opening of the Equitel plant on Route 8 in the San Martin district (1958).

j. Electrification of the Cities Service oilfields in Mendoza and equipment of the telephone exchange for the presidential mansion (1968).

k. Start of operation of the Atucha nuclear power plant using natural uranium as a fuel, with an installed power of 320 MW (1974).

l. Installation in the French Hospital of the first computerized tomography equipment in Argentina.

m. Supply of six generators of 200 MW each for the El Chocon hydroelectric power plant (1977).

n. Lighting work for the River Plate, Cordoba and Mar del Plata stadiums and telephone systems for six substations for the World Soccer Championships (1978).

o. First of Argentina's local telephone exchanges with control by computer programs, equipped with the EWSD digital switching system in ENTEL's Costanera Exchange (1979).

p. KWU [Kraftwerk Union] won the bid to build the Atucha II nuclear power plant using natural uranium, with an installed power of 600 MW (1979).

q. Osram opened its model plant in San Isidro, with an investment of $13 million (1980).

r. A consortium led by Siemens won the bid to provide half of the 20 generators of 138 MW power for the future Yacyreta hydroelectric power plant (1981).

s. ENTEL awarded to Equitel and Siemens AG a contract for the supply and installation of 150,000 EWSD electronic technology lines. This represents Argentina's move away from manufacturing analog technology, going to digital technology; contracts were also awarded to supply 432,000 telephones (1982).

t. The first factory of what is today the Siemens industrial complex opened at the start of the century. It produced porcelain for making fuses. In addition, it also manufactured electric meters, cables, electric motors and portable radio stations. These radio stations were exported--to the army of China!

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